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THE FRENCH NAVY.

The naval expenditure of France for 1909 is estimated at 13,316,086*l*. The heaviest expenditure made by the French Republic for naval purposes in any previous year was that of 1906—viz., 13,003,278*l*; and the outlay contemplated for 1909 will be seen to be 312,808*l* in excess of that great sum. Even now, however, the naval expenditure of France is much smaller than that of Great Britain. In 1901 France expended 12,271,949*l*. for naval purposes, while, as we have just stated, the outlay contemplated for 1909 will be 13,316,086*l*. Assuming that the estimate for 1909 is finally adopted, the naval expenditure of France will have increased in eight years to the extent of 1,044,137*l*. But, after all, the French figures are small when contrasted with the naval expenditures of Great Britain, which increased as follows in the 10 years ended with 1907, inclusive:

Year.	Expenditure, £.
1897-8.....	20,850,000
1898-9.....	24,065,000
1899-1900.....	26,000,000
1900-1.....	29,520,000
1901-2.....	31,030,000
1902-3.....	31,170,000
1903-4.....	35,476,000
1904-5.....	36,830,000
1905-6.....	33,300,000
1906-7.....	31,434,000

It will be seen that the British totals throw the French altogether into the shade. It should also be observed in connection with the French estimates for 1909 that although they show a gradual increase in French naval expenditure, this advance is due, to some extent, to more liberality in the remuneration accorded to French naval officers, engineers, etc. Still, allowing for this, there is no doubt that France is bent, upon the whole, upon maintaining her relative naval strength and even increasing it.

The naval force of France proposed to be maintained next year in the Mediterranean will comprise a first squadron of six ironclads and three

armour-plated cruisers, and a second squadron of equal strength. Both these squadrons are to be kept in a thoroughly effective condition and are to be ready for what the French navy authorities call an "immediate mobilization." There is also to be a reserve Mediterranean squadron of three ironclads, in which young French sailors and sailor lads are to go through a course of instruction. The force will be further completed by a division of six torpedo-boat destroyers, to be kept in a thoroughly effective state all through the year. The naval force intended to be maintained in the Atlantic will comprise a squadron of six armour-plated cruisers and two divisions of torpedo-boat destroyers, each division to include six vessels. All these vessels are to be kept in a thoroughly effective condition all through the year. A reserve of nine coast-guard vessels is also to be kept up at Cherbourg. These vessels are to receive their armament as soon as their crews have been completed. The old Atlantic naval division is to be suppressed and the points where it was stationed are to be visited from time to time by vessels detached from the Northern squadron. The naval division of the Extreme East will continue to be composed of three cruisers and gunboats, while a cruiser and despatch boat are to be kept in the Pacific.

It would appear to be the intention of the French Admiralty to continue a systematic development of flotillas of torpedo-boats and submarines. In January, this year, France had five flotillas in the Channel and Atlantic, and a similar number of flotillas in the Mediterranean. These flotillas comprised 22 torpedo despatch-boat destroyers, and 238 torpedo-boats. Of these 238 torpedo-boats, 53 were armed for exercise purposes, 86 were ready for immediate mobilization, 75 were

held in reserve, and 24 were used as school ships. France had also, at the same date, colonial flotillas comprising four torpedo-boat destroyers and 31 torpedo-boats. At the commencement of 1909, France expects to have 28 armed torpedo-boat destroyers, 52 torpedo boats armed for exercise purposes, 93 torpedo-boats held in readiness for immediate mobilization, 66 held in reserve, and 24 devoted to school purposes. In the colonies no change is proposed to be made in the course of this year. By 1909 old torpedo-boats will accordingly be replaced by modern torpedo-boat destroyers; and, at the same time, the number of torpedo-boats available for various purposes will be increased. Torpedo-boat destroyers of a 300-ton displacement type will also have become sufficiently numerous to allow ten or twelve to be kept in reserve, so as to be ready to form divisions in case of mobilization or to replace others which, although armed, have become temporarily unavailable.

As regards submarines, France claims to be making sensible progress. Irrespective of four submarines which are now at Saigon, France had, at the commencement of this year, 30 submarines or submersibles fully armed, and seven engaged in experiments. At the commencement of 1909, according to present anticipations, the Republic will have forty-four armed submersibles and six other submersibles making experiments; and it should be added that the augmentation is represented by vessels of a relatively important tonnage, and more adapted for "habitability" and endurance. The construction of torpedo boats by the French Admiralty has been suspended since 1905. France now possesses 240 of this class of vessel, and the total is in excess of what is deemed necessary by the superior naval council. It is con-

sidered that the role of torpedo-boats is strictly limited to surprise attacks in the immediate neighborhood of points at which they are stationed. It is, therefore, proposed to devote more attention to the building of torpedo-boat destroyers and submarines, and to endeavor to improve their sea-going qualities.

It should be remarked that French torpedo-boat destroyers date from 1898, and that their displacement has been progressively increased. Their speed was originally fixed at 26 knots; it has since risen to 28 knots, and in recent trials French destroyers have steamed at the rate of 29, or even 30 knots. Their armament has experienced scarcely any change; it was originally made up of one heavy gun, six smaller guns, and two torpedo-tubes. Six torpedo-boat destroyers, which were laid down in 1906, showed, however, a further step in advance. Their speed is at least 28 knots, and their armament comprises six heavy guns and three torpedo-tubes, while their displacement has been carried from 410 tons to 445 tons. Last year five more torpedo-boats were laid down upon the same bases. The budget of 1908 also authorized the laying down of ten more torpedo-boat destroyers of a similar type; their speed is to be carried, if possible, to 31 knots, and their armament will comprise two much heavier guns and four guns similar to those supplied to vessels built in 1906 and 1907, while each is to carry six torpedo-tubes. In 1909 it is proposed to lay down seven more torpedo-boat destroyers; these may be modified in some of their details by the experience acquired in connection with those built in 1906, 1907, and 1908. As regards submarines, it is expected that ten vessels of that type, which were laid down in 1907, as well as five more, which are to be commenced in 1908, will attain a speed of 13½ knots. In 1909 six more submarines are also to be built.—*Engineering, London.*

SHIP BUILDING IN THE UNITED KINGDOM.

From the returns compiled by Lloyds Register of Shipping, it appears that, excluding warships, there were 386 vessels of 799,178 tons gross under construction in the United Kingdom at the close of the quarter ended June 30, 1908. The particulars of the vessels in question are as follows, similar details being given for the corresponding period in 1907 for the purpose of comparison:

Description—	June 30, 1908.		June 30, 1907.	
	No.	Gross tonnage.	No.	Gross tonnage.
Steam:				
Steel	348	793,980	500	1,235,730
Iron	1	500	1	500
Wood and composite	1	25	...	...
Total	349	794,005	501	1,236,230
Sail:				
Steel	24	4,352	43	13,149
Iron .....	...	...	...	...
Wood and composite	13	821	20	939
Total	37	5,173	63	14,088
Total steam and sail....	386	799,178	564	1,250,318

(For warships, see Table 6.)

The tonnage now under construction is 48,000 tons less than that which was in hand at the end of last quarter, and 451,000 tons less than that building 12 months ago, and is the lowest total recorded in the society's returns since 1895.

Of the vessels under construction in the United Kingdom at the end of June, 283 of 545,929 tons are under the supervision of the Surveyors of Lloyds Register with a view to classification by this society. In addition, 69 vessels of 199,609 tons are building abroad with a view to classification. The total building at the present time under the supervision of Lloyds Register is, thus, 352 vessels of 745,538 tons.

LIVERPOOL'S PORT TRADE.

The annual statement of the Mersey docks and harbor board for the year ending July 1, 1908, indicates that while the number of ships using the port of Liverpool and the tonnage in and out shows a very satisfactory increase, the revenue of the board shows a decline of just under £40,000, this being spread over nearly every department. The grand totals may be set out together for comparison:

	Number of		Receipts.
	Vessels.	Tonnage.	
1907	25,635	17,064,211	£1,431,907
1908	25,739	17,111,814	£1,392,304

*104 *47,603 †£39,603

*Increase. †Decrease.

The tonnage given here represents the total net register tonnage of vessels paying rates to the board, inwards or outwards, as the case may be. To arrive at the total tonnage which entered, and the total tonnage which left the river Mersey, it is necessary to double the figures. The approximate total tonnage, inwards and outwards, for the year just ended would therefore be 34,223,628 tons.

Paying dock tonnage rates there entered 121 foreign trading sailers of 144,170 tons, compared with 165 vessels of 189,600 tons, and 1,176 coastwise sailers of 129,515 tons, against 1,263 vessels of 128,403 tons in the previous

year. The foreign-going steamers paying dock tonnage dues numbered 4,026 vessels of 10,999,828 tons, against 4,206 vessels of 10,998,161 tons, and coastwise there were 10,303 vessels of 2,127,994 tons, against 10,246 vessels of 2,140,632 tons. In steamers the figures were: Foreign, 1,564 vessels of 2,148,848 tons, against 1,596 vessels of 2,230,684 tons, and coastwise, 7,155 vessels of 1,406,268 tons, compared with 6,790 vessels of 1,214,172 tons.

The receipts include rates received on vessels and rates and dues received on goods. The total rates received on vessels amounted to £737,995, compared with £747,329, a decrease of £9,334. The rates and dues on goods made a total of £654,308, against £684,578, and this, added to the rates on vessels, brought the grand total to £1,392,304, which compares with £1,431,907 last year.

LARGER DOCKS FOR EAST BOSTON.

The plans of the New York Central & Hudson River railroad for rebuilding its docks in East Boston, which were destroyed by the recent fire, will be laid with a view to providing larger and better facilities for loading and discharging as well as making it possible for larger vessels to use the piers. When rebuilt they are to be so arranged that two steamships may load or unload at the same time. The railroad company is also to replace the grain elevator which was burned in the same conflagration.

BRITISH NAVAL MANEUVERS.

The British naval maneuvers in the North Sea recently in which 315 warships participated comprised the greatest naval spectacle the world has ever seen. Theoretical war was declared and the channel fleet under Admiral Lord Charles Beresford was directed to attack Great Britain, while the home fleet and a portion of the Atlantic fleet, under Vice Admiral Sir Francis Bridgeman, conducted the defense. The entire direction of the forces of the defense was controlled by the admiralty board in London, 300 or 400 miles distant from the scene of action, by wireless telegraphy, but communication with all the ships was both rapid and accurate.

The steamer Colonel went aground in Sandusky Saturday night but was released by the tug A. C. Harding after the lighter Rescue had taken off 100 tons of coal.

COMPARATIVE TESTS OF OLD AND NEW MANILA ROPE.

The following article from the *Engineering Record* concerning comparative tests of old and new manila rope is of considerable interest to vessel owners, and men aboard ship, as revealing the strength of manila lines used in mooring:

Heavy bridge erection work is involved in the separation of street grades and other improvements in the six-tracking of the Harlem branch of the New York, New Haven & Hartford R. R. Bridges over the railroad carry street 100 ft. wide or three longitudinal lines of girders with transverse floorbeams. They are proportioned for heavy city traffic and for large dead loads, including concrete floors and pavements. This requires massive girders weighing from 35 to 70 tons each, and Lewis F. Schoemaker & Co., who have the contract for a number of these bridges, decided to erect them up to 40 tons complete with a guyed derrick having both hoisting and topping lift falls made with 13-part tackles rove with 2-in. manila lines over 12-in. sheaves.

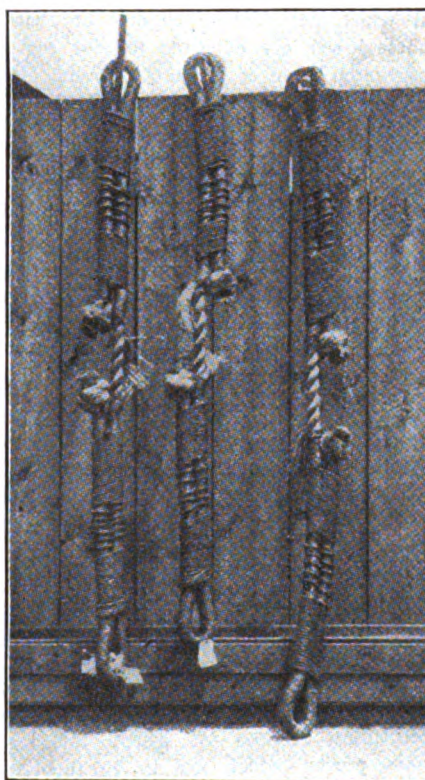
It was observed, as in previous cases, that when the line was new considerably more power was necessary to operate the tackles under a given load than was necessary after it had been some time in service and become more pliable. The question, therefore, arose whether the severe bending around the 12-in. sheaves might not have developed internal friction sufficient to cause a serious deterioration in the rope. Little or no data exist on this point, and none being available to the contractor's engineers, it was determined to make some practical tests to show the actual strength of the rope employed and to throw such light as might be attainable on a subject of great importance to the safety and economy of bridge erection.

For this investigation it was decided to take specimens from three coils of 2-in. manila line, each 1,000 ft. long, which were typical of other lots of rope used by the contractor. One coil had been used in the spring of 1907 for the erection of 35-ton girders on the Boston & Albany R. R., and for subsequent lighter service. It had received excellent care and had been protected from the weather, so that it had never been allowed to remain wet in the coil, although subject to showers and immediately drying while in service. The other two coils were purchased new this spring, one of them had been used and one of them had not been used, so that an opportunity was afforded of making comparative tests of similar rope under known conditions.

A piece of rope about 15 ft. long was cut from each coil and was closely wrapped with 3/16-in. diameter cords from each end to within about 6 in. of the cen-

ter, which was left unwrapped. The wrapped ends were then bent double, forming bights, and the loose end and the standing part were lashed together in two places with 3/8-in. lines, thus forming a piece about 7 ft. long with a loop at each end for attachment to the testing machines.

Specimen 1 was taken from the old rope, which has been used in erecting two 35-ton girders with a nine-part tackle and 12-in. sheaves. It had also been used in erecting 40-ton girders with 13 part tackles and 12-in. sheaves. It broke under an ultimate strain of 32,245 lb., and showed an elongation of 11 in. Specimen 2, which had been used in the erection of four 40-ton girders, broke under an ultimate stress of 38,490 lb., and



SAMPLE TESTS OF ROPE.

showed an elongation of 12 in. Specimen 3, which had never been used, developed an ultimate strength of 35,180 lb. and an elongation of 13 in. The strength of new 2-in. manila rope is given by Trautwine at about 27,500 lb., by C. W. Hunt at 28,500 lb., and by E. H. Fidler Co., at 28,210 lb.

The ropes here tested were manufactured by E. H. Fidler Co., Philadelphia Cordage Works, who based their value given above on government tests, but state that these specimens were better than the ordinary grade of manila rope on account of the special hard-laid quality. It was observed that the ropes stretched throughout the whole length, even including that portion of the loop

which passed around the shackle pins. The percentage of elongation was, however, much greater in the 12-in. unwrapped portion than it was in the remainder of the rope, being 3 in. in one case against 8 in. for the remainder. When the ropes failed the lashings held and only one of the strands was found to have been severed.

The ropes were pulled in an Olsen hydraulic testing machine of 800,000 lb. capacity, used for testing chains at the works of Bradley & Co., Philadelphia. The machine is operated by a belt on the pump, and the balance lever is operated by hand. A long trench is provided with notches about 10 ft. apart to provide bearing for transverse pieces to which one of the shackles is attached. The other shackle is connected to the plunger, and the carriage moves on guides on the edges of the trench.

It is to be hoped that more tests will be made along the same line to investigate the stiffness of the ropes, the allowable diameter of sheaves, the effect of internal friction between the strands and the effect of careful service. Such data would be of great value to bridge erectors and to shipping interests.

Mr. Lewis D. Rights, eastern manager of the Lewis F. Shoemaker & Co., Schuylkill Bridge Works, observed the tests and recorded the data given here.

BRITISH SHIP BUILDING SLUMP.

Ship building in all the British centers is in a very bad way indeed. The official returns show that in May the additions to the registers were less than the removals. There were added 30,000 tons of new steamers, and there were removed 32,000 tons. Of new sailing vessels, 2,000 tons were added, and the removals were over 8,000 tons. Thus, in one month, British steamer fleets decreased by 2,000 tons, and sailing ships by 6,000 tons, a net decrease of 8,000 tons of shipping in the time named.

PEARY'S SHIP STARTS NORTH.

The Arctic exploration ship *Roosevelt*, in which Commander Peary is again to make an effort to locate the magnetic North Pole, sailed from New York July 6. She was given an enthusiastic send-off. A stop was made at Oyster bay in order that President Roosevelt might have an opportunity to inspect the ship. Commander Peary is not to join the vessel until she has reached Sydney, Cape Breton, from whence he will proceed to his first base at Etah, Greenland.

Major Graham D. Fitch, government engineer, with head-quarters at Duluth, is making a tour of his district in the government yacht *Vidette*.

PROGRESS OF WARSHIPS AND MACHINERY UNDER CON- STRUCTION IN ENG- LAND.

FROM *The Engineer*, LONDON.

As a leading London daily newspaper in one of its issues during the past month gave its readers what may justly be cited as a sensational description of a monster battleship to be laid down in Portsmouth Dockyard, on the slip to be shortly vacated by the battleship *St. Vincent*, we deem it advisable to assure our readers that no such naval construction has been contemplated by our Admiralty authorities; the detailed description of the imaginary "World's Largest Battleship" being nothing but pure supposition on the part of the writer; seeing that it is stated that she is to be some 3,000 tons heavier than the *Dreadnought*, and is moreover to be propelled by "gas" engines, a type that is so far only in the experimental stage.

That a new battleship will be laid down in Portsmouth Dockyard, as soon as the *St. Vincent* takes the water, is already known; but no particulars as to her dimensions, engine power, armament, or speed, are yet known; with this exception, that the vessel is to be an improvement on the *St. Vincent*.

With the foregoing intimation and giving as heretofore priority of place in our record to the actual work completed and in progress in the Royal Dockyards, we first note that, since the date of the issue of *The Engineer* of January 10th last, such satisfactory progress has been made with the battleship *Bellerophon*, built at Portsmouth, that she gives promise of being ready for commission, complete in all respects—although no "overtime" has been worked upon her—within the two years allowed for her construction.

The unarmoured cruiser *Boadicea* being built at Pembroke Dockyard, and noticed in our record of January 10th last as progressing very satisfactorily in her construction, was successfully launched on the 14th of last May. This vessel is an improved and enlarged Scout, being 385 ft. long, with a displacement of 3,300 tons, and having at her load water draught a bunker capacity of 350 tons. She will carry 100 tons of oil fuel. Her turbines—of 18,000 indicated horse-power—drive four propeller shafts, each fitted with a three-bladed screw propeller, cast in one piece with the boss. At full power her turbines are expected to make 500 revolutions a minute, and to propel the ship at 25 knots. Steam is supplied by twelve Yarrow boilers, worked at a pressure of 235 lb. per square inch—reduced at the engines to 170 lb. per square inch—the shipment of which on board was completed in three days—a record piece of work, reflecting great credit on all concerned, as the ship had first to be re-

moved from her mooring to get her into a suitable position under the shear legs. The *Boadicea* is the first ship built at Pembroke to be fitted with turbine machinery.

The keel plate of a new cruiser of the *Boadicea* class was laid down in a formal way at Pembroke Dockyard on the 15th of June, the laying down consisting in the plates being drawn into position on the blocks by an electric motor, and the first rivet driven into them by a pneumatic arrangement improvised for the purpose. Originally intended as a replica of her sister—the *Boadicea*—she is to have an additional displacement of 50 tons, but is to be of the same draught. The new ship will be 385 ft. long between perpendiculars, have an extreme breadth of 42 ft., a displacement of 3,350 tons, and a mean water draught of 13 ft. 6 in., at which her turbine engines of 19,000 horse-power are expected to give her a maximum speed of 25 knots an hour. Her coal and oil fuel stowage will be 450 tons.

The testing of the condensers, steam pipes, and other small details of the armoured cruiser *Defence*, built at Pembroke Dockyard, having been dealt with early in the past half year, the preliminary basin trials of her propelling engines have been made, and were highly satisfactory, both engines having first worked together at a quarter speed, and then separately at half speed.

The battleship *St. Vincent*, the keel-plates of which were laid in the last week of December, 1907, at Portsmouth, will at the date of her launch, on the 10th of September next, have been under construction but eight months and a-half. She is of the improved *Dreadnought* type, but has a displacement of 19,250 tons, or 1,350 tons more than the type ship. She is 500 ft. long, with a beam of 54 ft., and a mean water draught of only 27 ft. Her propelling engines—of 24,500 indicated horse-power—which are to be turbines, are designed to give her a speed of 21 knots under natural draught, steam being supplied by boilers of the Babcock and Wilcox type.

The propelling machinery, of the *St. Vincent* is being made by Scott's Shipbuilding and Engineering Company, of Greenock, and rapid progress has been made with it during the past six months. The boring out operations in connection with the propeller shafting is also proceeding apace at the ship. The work on the steam generators is also in a very forward state. In accordance with the latest Admiralty practice, these are adapted for burning oil fuel in conjunction with coal.

With the *St. Vincent* afloat, and completed, there will then be four ships in active service in our Navy that embody in their design and construction the *Dread-*

nought principle; not taking into account several others of the same type being built or not yet completed for sea. The *St. Vincent's* building progress has been extremely satisfactory, as no "overtime" has been worked on her.

The progress of the battleship *Collingwood* at Devonport Dockyard, which was commenced on February 3rd—a little over a month later than that on the *St. Vincent*—has been very satisfactory. Up to February 8th, 700 tons of material had been worked into her hull; by April 25th, 2,500 tons; by May 7th, 2,900 tons; and in the four working months after the ship was laid down about 3,300 tons. Such work reflects great credit on all employed on her, as the building "staff" was smaller than usual on a similar sized vessel; and the "slip" not provided with such modern appliance as to enable work to be carried on more expeditiously and economically when on it than when afloat. The ceremony of laying the *Collingwood's* keel plate—which was in two portions—consisted in first riveting the two parts together, and then transporting them to their proper position on the blocks. The ship is the sixth battleship of the *Dreadnought* type, and represents the latest ideas in big warship design.

The keel plate of a new armoured cruiser of the *Boadicea* class, to be named the *Caractacus*, was formally laid on the building slip at Pembroke Dockyard on the 5th of June. She will be 385 ft. long, 42 ft. beam, and have a displacement of 3,350 tons, her mean water draught when loaded being 13 ft. 6 in. She will be propelled by turbine engines of 19,000 indicated horse-power to give her a speed of 25 knots, and will be armed like the *Boadicea*.

The ships in the "completing" stage in the Royal Dockyards are the battleship *Bellerophon*, at Portsmouth; the armoured and unarmoured cruisers *Defence* and *Boadicea*, at Pembroke; and the cruiser *Shannon*, at Chatham; the last vessel will shortly be ready for commission.

Turning, now, to the progress made in the past six months in warship and machinery construction in the private shipyards and engine works engaged in these industries in England, we find that during that interval, owing to the recent strike of shipyard workers in the Tyne district, a steady progress of warship construction, at the works of Sir W. G. Armstrong, Whitworth, and Co., at Elswick, has not been maintained. Considerable progress has, however, been made, in the work on the armoured cruiser *Invincible*. The main armament of the ship is well advanced; the propelling and auxiliary machinery are practically complete; and the usual test at the moorings have been carried out. The machinery trials are expected to take place shortly. The work on the battleship *Superb* is

approaching completion, the fitting of the propelling machinery is in an advanced state, but its further progress is retarded by the engineers' strike. The Brazilian battleship Minas Geras is to be launched in September, the work on board to that end rapidly approaching completion; the boring operations at the stern being finished, and the propeller shafts and propellers fitted in place. The progress of the fast scouts, Bahia and Rio Grande do Sol, for the Brazilian navy, has been somewhat delayed, but the framing and plating of the hulls are being pressed forward, so that a considerable advance may be looked for during the next six months. Since our last report on work at the Elswick shipyard, the Argentine river gunboat Parana has been successfully launched, and the work on board is well forward—machinery, armament, and general fittings being well in hand. The sister ship Rosario, still under construction, is well advanced, and her launch may be looked for early this month.

Owing to the strike of shipyard workers, there is very little to report in the way of warship work effected at Messrs. Hawthorne, Leslie and Co.'s establishments at St. Peter's, or Hedburn, during the past six months. The machinery, etc., of the battleship Agamemnon, constructed at St. Peter's having been previously fitted on board and the sea and other trials successfully carried through, the vessel has been completed and handed over to the Admiralty, and is now commissioned. The strike prevailing in both the engine works and shipyards has delayed the completion of the 33-knot torpedo boat destroyer Ghurka—whose successful trials were recorded in our last report—and she is still in the hands of her builders ready to be opened out for examination before Admiralty acceptance.

The Afridi, a similar vessel to the Ghurka, but built at Elswick shipyard, fitted with turbine engines by the Parsons Company, and boilers made at St. Peter's—a duplicate of those in the Ghurka—had also been laid up owing to the strike. The work on the 33-knot destroyer Zulu, an improved Ghurka, has just been started at the Hebburn shipyard. The material for the turbine machinery and boilers of the battleship Collingwood is all in the workshops at St. Peter's, but owing to the labor trouble no machine work has yet been done on it. Of the first class torpedo boats Nos. 21 and 22—built—and Nos. 33 and 34—building—the first mentioned has been tried at sea, but progress has been stopped owing to labor troubles; while the second vessel, No. 22, which has all her machinery on board, is similarly affected. To the same cause no progress has been made in the building of the boats Nos. 33 and 34 at the Hebburn shipyard since our last report.

• Palmer's Shipbuilding Company at Jar-

row during the past six months has been engaged on the following work for the Admiralty:—The completion of the "trials" of the battleship Lord Nelson, which were very successful, the ship having since remained alongside the works for final completion. The construction—still in hand—of the 33-knot torpedo boat destroyer Viking; the successful launching and preparation for her trials of first-class torpedo boat No. 24; the similar class boats Nos. 35 and 36 are now on the stocks. It is to be noted that owing to the strike of engineers and shipyard workers, work on the above-mentioned vessels has, as a consequence, been much delayed, and it may be truly stated that but for this the battleship Lord Nelson would have been handed over to the Admiralty.

Passing from the Tyne to the Thames, there being no warship work on the Humber, we find that such work has also practically left the Thames, Messrs. Yarrow and Co., formerly of Poplar, having migrated to Scotstoun, Glasgow, and Messrs. Jno. I. Thornycroft and Co. from Chiswick to Southampton. Following the usual routine of our notices of warship work completed or in progress, we next record that effected in the past half-year by the Southampton firm. Having stated in our last report the actual results attained by the ocean-going destroyer Tartar—built at the works at Woolston, Southampton—on her preliminary and official trials, we now record that she was completed and handed over to the British Admiralty last April.

The Amazon, another vessel of the Tartar type, but with more power and displacement—now in hand—will be launched with boilers and machinery on board in the course of a few weeks, her internal work being in an advanced stage. The Nubian, a similar vessel to the Amazon, is on the stocks and in a forward condition. Of the torpedo boats being built or completed at Woolston, No. 19 has completed her official trials very satisfactorily—the contract speed being exceeded—and was handed over early in June. No. 20 has completed her preliminary trials, and is now ready for her official runs; her completion for sea and delivery will be effected within the next few weeks. Two other torpedo boats in hand for the British Admiralty—Nos. 31 and 32—are in an advanced state, and will take the water in course of the next two months. All the vessels above mentioned are adapted to burn oil fuel, and their turbine machinery has been, or is being, constructed at Messrs. Thornycroft and Co.'s Southampton Works, where in future it is intended to construct all boilers, the shops and plant having been removed from Chiswick for this purpose.

Cammell Laird and Co., Limited, of the Shipbuilding and Engineering Works, Birkenhead, have since our last record of their work, completed and handed over to the Admiralty the sea-going destroyer Cossack. The similar but faster vessel Swift is now nearly ready for her trials.

At the shipbuilding works of Vickers, Sons and Maxim Limited, at Barrow, the keel plate of the battleship Vanguard, an improved Dreadnought, was laid on April 2. The tender for the building of a similar vessel, the Rodney, by the firm, has also been accepted by the Admiralty, and the order to proceed with its construction has been given. This vessel will have a displacement of 20,000 tons, and will be armed with ten 12-in. guns and several others of smaller caliber. She will be the fourth battleship built at Barrow for the British navy.

J. Samuel White & Co., Ltd., at East Cowes, have delivered during the past six months the torpedo boat destroyer Mohawk and torpedo boats Nos. 13, 14, and 15 to the admiralty; No. 16 has finished her trials, and is now being completed for sea; and the destroyer Saracen, built by the firm, has been launched.

Yarrow & Co., Ltd., since their removal from Poplar to Scotstoun, Glasgow, inform us that since the end of last year the second and third destroyers, Nafkratoussa and Lonki, built for the Greek Government, have left their works at Poplar, and have safely arrived at Athens. The fourth vessel, the destroyer Sfondoni, has also been handed over to the Greek authorities, and is expected to leave the Thames shortly. The "Yarrow" boiler constructed for the Spanish gunboat Marques de Molins has been forwarded to Lisbon; the ten sea-going torpedo boat destroyers for the Brazilian Government are still under construction, four of them being well advanced, and one, it is hoped, will be launched in a couple of weeks. The two motor boats constructed for the Austro-Hungarian Government have just run their trials successfully. They are 60 ft. long by 9 ft. beam, and have a contract speed of 22 knots.

Capt. Harris W. Baker succeeded in raising the sunken steamer H. P. McIntosh and she proceeded down the river under her own steam.

Capt. J. C. Bell, master of the steamer German, met with a peculiar accident at Ashland last week. He was knocked off the boat into the bay by a lump of coal falling upon him. The blow rendered him unconscious and it took some time to resuscitate him.

A dredge owned by John Martin, of Menominee, Mich., was burned at that port last week.

GERMAN SHIP BUILDING INDUSTRY.

Some statistics just published throw an interesting light upon the German shipbuilding industry and the manner in which a number of German ship-owners, in spite of the development and increased efficiency of the home industry, continue to favor foreign yards, especially English, with a large proportion of their contracts. On the other hand, it is of interest to note that Germany for the last ten years has been able to build all her own new warships, in spite of the rapid growth of her navy. The following table shows the aggregate output of vessels built at private yards during the last 10 years:

Year.	Warships.		Merchant Ships.		River Vessels.		Total.	
	Number.	Registered Tons.	Number.	Registered Tons.	Number.	Registered Tons.	Number.	Registered Tons.
1898	24	27,733	178	154,865	131	26,237	333	208,835
1899	*24	27,733	120	144,702	71	10,506	215	182,941*
	9	3,090	307	209,901	150	23,633	466	236,624
1900	*9	3,090	222	196,738	46	4,451	277	204,369*
	19	15,926	282	242,362	84	14,490	385	272,778
1901	*19	15,926	169	223,423	27	3,158	215	242,507*
	26	38,160	234	232,856	181	20,687	441	291,703
1902	*26	38,160	168	219,343	36	3,496	230	260,999*
	11	26,657	302	201,852	194	32,489	507	270,998
1903	*11	26,657	176	178,824	40	6,802	227	212,283*
	12	28,256	294	248,562	201	28,493	507	305,311
1904	*12	28,256	179	227,605	38	3,822	229	250,683*
	4	24,430	465	227,125	65	9,156	534	261,711
1905	*4	24,430	237	182,961	37	3,608	278	210,990*
	4	30,630	537	266,761	104	10,970	645	308,361
1906	*4	30,630	228	217,101	88	9,102	320	256,833*
	8	23,671	623	355,053	126	12,267	757	390,991
1907	*8	23,671	257	303,061	102	11,273	367	338,005*
	15	30,408	241	324,655	195	13,377	951	368,440
1907	*15	30,408	247	268,032	173	12,663	435	311,103*

Figures between * represent the steamers.

Of the above total, a varying percentage is for foreign account, the largest aggregate tonnage—48,166 registered tons—referring to the year 1901, the smallest—16,637 registered tons—to 1904. The figures include several warships, the largest number—sixteen—in 1898, but the largest tonnage—18,788 registered tons—in 1902; the three following years show no warships built in Germany for foreign account, whilst there were two for 1906 and four for last year. At the same time the number of vessels, of which sailing vessels formed a small minority as regards tonnage, built at foreign yards for German owners was generally far in excess of vessels built in Germany for foreign account as far as tonnage was concerned. The aggregate tonnage built abroad for German account in 1906 amounts to 122,845 registered tons, next comes last year with an aggregate of 119,

512 registered tons; of these aggregates respectively thirty-seven and thirty-five steamers account for 100,912 tons and 90,278 tons. The smallest figure during the decade under review relates to 1904, with 17,611 registered tons, of which only 4,330 registered tons are steamers—three.

CANADIAN STEAMER BEAVER-TON.

The steamship Beaverton of the Mathews Steamship Co. Ltd., Toronto, one of the latest additions to the ever increasing fleet of steam freight carriers on the Canadian Lakes, has been built by the well known firm of Robert Stephenson & Co Ltd. (who make a specialty of this class of vessel) at their shipyard at Hebburn

surface-condensing type, taking steam from two cylindrical multi-tubular steel boilers working at 185 lbs. per sq. in., and have been built to the requirements of the British corporation and board of trade.

The accommodation is very ample and has been fitted out in a thoroughly up-to-date manner with electric light, steam heating and sanitary installation all by (eminent) British firms. The owners' private apartments and the captain's quarters forward, also the dining room aft, are tastefully paneled in oak and mahogany, while the officers' and engineers' quarters are done out in solid birch and varnished.

The general outfit and equipment of the vessel is to a very full specification and she ranks as one of the most efficient vessels of her type now on the lakes. She is capable of taking 2,350 tons dead weight freight on a moderate draught in fresh water and of steaming over 9 knots per hour while laden.

A sister ship, Edmonton, by the same builders, has been running on the lakes for the last two years and has given great satisfaction to her owners.

BIG TIMBER LAND TRANSACTION.

What is said to be the largest single sale of timber land in the history of West Virginia has been made by the Baltimore & Ohio Railroad Co., to a corporation which will at once begin development. The purchasing company has mills at Ridgeway and at Camden-on-the-Gauley, within reach of the tract. The combined capacity of its mills is 350,000 ft. a day. Two million dollars is the reported price paid for 200,000 acres of hardwood, chiefly virgin forest, containing yellow poplar, cherry, oak, maple, birch, ash and many other valuable woods.

The land lies in a mountainous region drained by northeastern tributaries of the Great Kanawha which empties into the Ohio about 300 miles from Pittsburgh. It is one of the largest and most valuable bodies of hardwood timber remaining in the Appalachian region. Many of the mountain ranges which cross the tract, are from 3,000 to 4,000 ft. high, and covered to their summits with rich forests.

North of this tract, but drained by the same streams, lies another holding of 129,000 acres, recently secured by a pulp company. This is covered with spruce and hemlock, with many patches of hardwoods. Development of the property, it is said, will begin in the

on-Tyne, England. Her dimensions are up to the limit of size which can be locked through the Welland canal and she has been designed to take both bulk and package goods on the same trip. A'tween deck having been built for facilitating the stowage of these. To expedite the discharge of cargo, large watertight side doors are fitted through shell in 'tween decks, by means of which the package freight can be got out while the deck hatches are being used for bulk freight in lower hold.

The scantlings of the hull have been specially arranged to meet the exigencies of the trade on the canals and lakes and have obtained the highest class under the British corporation for this service. The propelling machinery placed aft in accordance with the general practice on the lakes has been built by the Northeastern Marine Engineering Co., Ltd., at their Wallsend works on the Tyne. The engines are of the triple-expansion,

immediate future. The two bodies of land lying in the same region, aggregate more than 500 square miles of primeval forest about to be turned into marketable products.

The stripping of the forest cover from a region so large and so mountainous will be watched with interest by those who study the effect of the soil cover on stream flow. The rainfall over the region is very heavy—more than 4 ft. annually. Snow 6 ft. deep on the timbered mountains, while not usual, is an occasional occurrence. Fire is sure to follow the usual methods of lumbering, and unless this region is more fortunate than most lumbered tracts in that part of the Appalachian plateau, many of the summits and sides of the mountains will be laid bare to the soil and rocks. The rainfall and melted snow, which are now retarded by the forests, will then pour down the naked slopes and cause destructive floods in the lower streams, and low water will follow.

West Virginia is one of the states which has taken no measures to protect its valleys from floods by preserving the forests on the mountains. Its woods are being cut and burned more rapidly perhaps than those of any other state, and this in face of the fact, that it is by nature a forest state, with soils and situations suited to almost all eastern timber trees. It might perpetuate its forests and have woods of immense value always. A little protection against fire, the leaving of small trees to form the future forest, and provision for reproduction by means of seed trees, are simple measures, but they would mean all the difference between wasted hill-sides and well stocked forests, ripe for the ax. A few years would bring handsome returns from the investment.

BOSTON MARINE NOTES.

Boston, July 29.—A crusade has been started in these waters by the Treasury department, through its inspectors, against negligent owners and operators of power boats. This action was made absolutely necessary owing to the appalling number of fatalities resulting from power-boat catastrophes continually occurring along the New England coast during the present summer season.

Regarding the inspection of small craft moved by power, instructions are set forth in Treasury department circular 139 of September 7, 1906, to which all owners of launches under 15 tons, carrying passengers for hire, are subject, and for failure to comply with same a penalty of \$500 is incurred, copies of which have been forwarded to all customs inspectors

along the coast. First, failure to carry one life preserver for each passenger on board. Second, failure of person in charge to be licensed by steamboat inspectors. Furthermore, where operator is licensed and undertakes to carry more than the inspector deems safe, notify operator that inspector will demand revocation of license for gross negligence. All concerned are notified that no leniency may be expected from department. These instructions have been communicated to principal revenue cutter officers, principal officers of the navy and supervising inspector of steam-boat service. Operators must be full fledged citizens of the United States and over 21 years of age.

Surveyor of the port of Boston, Jeremiah J. McCarthy, has procured the following digest of the law governing the class of boats in question, copies of which are being forwarded to all upon request:

"All motor vessels, without regard to size or use, must be provided with an efficient whistle or siren, fog horn and bell. The whistle must be of such character as to be able to produce a prolonged blast from four to six seconds' duration.

"At night all motor vessels must have a bright white light at the bow, a green light on the starboard side and a red light on the port side provided with proper screens. Whenever the green and red side lights cannot be fixed to the vessel they must be kept lighted and ready for use. They must also have a white range light aft.

"Such vessels are also required to have on board two printed copies of the rules which must be observed by them, furnished by local inspectors of steam vessels on request.

"All motor vessels under 15 tons engaged in carrying passengers for hire, in addition to the equipment above stated, are required to carry one life preserver for each passenger and to be operated by a person duly licensed by the local inspectors of steam vessels. Life preservers are not compulsory equipment for such boats, however, when they are used only as private pleasure boats."

JAPANESE SUBSIDIES ARE IN DANGER.

The agitation which has been carried on in Japan to reduce Japanese shipping subsidies is being continued with considerable vigor and is not unlikely to meet with a certain degree of success.

A representation was introduced in the lower house of the diet last session, advising a material modification of the present law, in the senate that whereas a steamer of not less than 1,000 tons and 10 knots is now eligible for encouragement money, these figures should be raised to 3,000 tons

and 13 knots. The period of the present law expires next December, and although the drastic amendment embodied in the above representation cannot be adopted, it seems to be felt that the treasury's yearly payments under this law are so large as to call for some amendment. On the other hand, there are valid reasons to doubt whether the progress of ship building in Japan will be as rapid in the future as it has been in the past. Several of the principal dock yards are largely reducing their staffs and are making strenuous efforts to obtain orders from foreign countries, so that in all probability the vessels on account of which encouragement money may have to be granted in the near future will be comparatively few. Since the ship building encouragement law came into force in March, 1896, the steamers built or in course of construction at dock yards in Japan under the subsidy granted number 88, with an aggregate tonnage of 200,900. Of these, 76 steamers, of 167,746 tons, have already been completed at the following dock yards:

	Steamers.	Tonnage.
Mitsu Bishi dock yard.....	30	106,066
Kawasaki dock yard.....	22	36,426
Osaka Iron Works.....	22	22,739
Ishikawajima dock yard.....	2	2,516
Total	76	167,747

As three of these steamers, the Tsukushima, Hitachi, and Shiga Maru, were subsequently lost, the subsidized steamers at present number 73, with a total tonnage of 159,237. The steamers recently launched and in course of equipment are as follows:

	Steamers.	Tonnage.
Mitsu Bishi dock yard.....	3	24,000
Kawasaki dock yard	1	8,600
Osaka Iron Works.....	3	4,160
Total	7	36,760

The steamers in course of construction under the encouragement certificate number 11, with a total tonnage of 78,240. These steamers are to be launched between August, 1908, and April, 1911.

The passenger steamer Huron while going out of Cleveland harbor July 27 collided with a scow in the river just below the Lake Shore bridge and cracked two plates. The scow and a dredge were working on the west side of the river and the big passenger steamer City of Cleveland was tied up at the Pennsylvania dock on the east side and the Huron could not get through. She went to the ship yard for repairs.

The Great Lakes Dredge & Dock Co. has been given contract amounting to \$15,000 for dredging the river at Lorain.



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TAFT'S SPEECH OF ACCEPT- ANCE.

Wm. H. Taft, Republican candidate for president of the United States, delivered his speech of acceptance under very trying conditions at Cincinnati on Tuesday last. Obviously anything that the candidate might say concerning the merchant marine would be interesting, but what Mr. Taft might say is doubly so, owing to his varied experiences in many quarters of the globe. After discussing the achievements of the administration, he added:

"The only respect in which nothing has been done is in the development of our foreign marine. As long as we uphold the system of protection for our home industries we must recognize that it is inapplicable to assist those of our citizens engaged in the foreign shipping business, because there is no feasible means of excluding foreign competition, and that the

only other method of building up such a business is by direct aid in the form of a mail subsidy.

"I am in favor of the bill considered in the last congress as a tentative step. The establishment of direct steamship lines between our Atlantic ports and South America would certainly do much to develop a trade that might be made far greater. On the Pacific the whole shipping trade threatens to pass into the control of Japan. Something ought to be done, and the bill which failed was a step in the right direction."

Mr. Taft has outlined the actual situation in a very few words. As long as protection is the settled policy of the United States government an adequate merchant marine in the foreign trade cannot be secured without the extension of this principle to shipping. That is as clear as sunlight. It is so obvious that it is absurd to argue it. Why protection should stop just at this point is one of the mysteries of American legislation.

Concerning the navy department. Mr. Taft is an advocate of a reasonable addition to the effective warship fleet annually. He is probably not as radical upon this subject as Mr. Roosevelt, but he is unmistakably in favor of a steady upbuilding of the navy. Upon this subject he says:

"Mr. McKinley and Mr. Roosevelt, and the Republican party, have constantly advocated a policy with respect to the army and navy that will keep this republic ready at all times to defend her territory and her doctrines, and to assure her appropriate part in promoting permanent tranquillity among the nations.

"We are a world power, and cannot help it, and, although at peace with all the world and secure in the consciousness that the American people do not desire and will not provoke a war with any other country, we must be prudent and not be lulled into a sense of security which would possibly expose us to national humiliation. Our best course, therefore, is to insist on a constant improvement in our navy and its main-

tenance at the highest point of efficiency."

Mr. Taft approaches the subject of tariff revision with great caution. He thinks that the tariff in a number of schedules exceeds the difference between the cost of production of such articles abroad and at home, including a reasonable profit to the American producer, and believes that in these instances revision is desirable. Obviously so. On this point the Republican candidate says:

"The Republican doctrine of protection, as definitely announced by the Republican convention of this year and by previous conventions, is that a tariff shall be imposed on all important products, whether of the factory, farm or mine, sufficiently great to equal the difference between the cost of production abroad and at home, and that this difference should, of course, include the difference between the higher wages paid in this country and the wages paid abroad and embrace a reasonable profit to the American producer.

"A system of protection thus adopted and put in force has led to the establishment of a rate of wages here that has greatly enhanced the standard of living of the laboring man. It is the policy of the Republican party permanently to continue that standard of living. In 1897 the Dingley tariff bill was passed, under which we have had, as already said, a period of enormous prosperity.

"The consequent material development has greatly changed the conditions under which many articles described by the schedules of the tariff are now produced. The tariff in a number of the schedules exceeds the difference between the cost of production of such articles abroad and at home, including a reasonable profit to the American producer. The excess over that difference serves no useful purpose, but offers a temptation to those who would monopolize the production and the sale of such articles in this country, to profit by the excessive rate.

"On the other hand, there are some few other schedules in which the

tariff is not sufficiently high to give the measure of protection which they should receive upon Republican principles, and as to those the tariff should be raised. A revision of the tariff undertaken upon this principle, which is at the basis of our present business system, begun promptly upon the incoming of the new administration, and considered at a special session with the preliminary investigations already begun by the appropriate committees of the house and senate, will make the disturbance of business incident to such a change as little as possible."

LAKE FREIGHT SITUATION.

The lake trade continues dull and listless, probably more lifeless at present than it has been at any time since the beginning of the year. Independent boats are from day to day going into ordinary as there is not enough freight moving to take care of contract tonnage. A Cleveland newspaper, ordinarily not given to inaccuracy of statement, reported that a leading shipper had sold from 1,000,000 to 1,500,000 tons of ore, and coming from so reliable a source it created widespread stir in the trade. Independent vessel owners began to importune the shippers for business, but the report appears to have been without foundation. Shippers made a canvass among themselves but could not find anyone who had the good fortune to dispose of such a quantity of ore. Sales are practically not being made at all and the trade is absolutely without animation. There can be little improvement in the market until sales of ore become active. Such a condition is not expected until September and may not occur even then. It is a mighty lean year for owners and leaner still for the crews for obviously if the vessels are not in commission they are not paid at all.

Coal shipments have been light of late.

PIG IRON SITUATION.

Developments of the past week show that the trend of events is still clearly in the right direction. The statement of earnings of the United States Steel Corporation reflects the slow progress from the long period of depression. The blast furnace output of the Corporation is now about 55 per cent, and its pig iron stocks are being reduced steadily. Brokers sold between 8,000 and 10,000 tons of southern iron to Detroit at \$11.50, Birmingham, but the transaction does not indicate that southern furnaces

would sell at that price into the first half of next year. There is renewed activity in steel bars, but the bar iron market is quiet. Railroads the last week bought 24,000 tons of rails. Prices are being maintained on both foundry pig iron and coke.

ENGLISH BUILT LAKE STEAMER.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, England, recently launched from their Neptune ship yard a steel screw steamer which they have built for service on the great lakes for the Western Steamship Co., Ltd., of Toronto, Ont., Canada.

The steamer was named J. A. McKee as she left the ways, the christening ceremony being performed by Mrs. J. Denham Christie, Tynemouth, wife of one of the directors of Swan, Hunter & Wigham Richardson, Ltd., who was acting as proxy for Miss Bassett, daughter of Capt. Bassett, of the Western Steamship Co. The vessel is specially designed for her service on the great lakes, being nearly 250 ft. in length, by 43 ft. beam, and will carry 3,240 tons deadweight on a moderate draught of water. The propelling machinery, which will be placed aft, is to be supplied by the North Eastern Marine Engineering Co., Ltd., of Wallsend, and consists of a set of triple-expansion engines, supplied with steam from two single-ended boilers. The loading and discharging arrangements are of the most complete character for speedy working, including three steam winches, while the holds are provided with many large hatches, so that conveyors may be used for quick discharge of ore and grain cargoes.

COAL VESSELS MUST BE CLEANED.

One of the leading coal shipping companies has served the following notice upon vessel agents at Buffalo:

"I am notified from our docks that some damage is being done to hard coal cargoes by reason of vessel not being properly cleaned of iron ore, before loading coal. You know that iron ore will paint coal or anything else and we cannot sell painted coal, and in future will have to hold vessels accountable for damages of this kind. A vessel should be cleaned as carefully for anthracite coal as for grain. Please instruct your officers, so we may avoid the unpleasantness of claiming damages."

IMPROVEMENTS TO THE MISSISSIPPI.

Captain G. H. Lukesh, of the engineering corps of the army, who has been in temporary charge of the improvement work on the Mississippi river between the mouth of the Missouri and the Ohio since the retirement of Colonel Sears, in a report submitted to the war department, estimates that it will cost the government \$17,751,654 to complete the project which was begun in 1888. To pay the expenses of the work for the fiscal year 1909 he recommends an appropriation of \$250,000.

During the year just closed the amount expended on the improvement of the Mississippi at St. Louis under Captain Lukesh was \$464,457, including \$250,000 which was carried by the river and harbor appropriation bill of the last session of congress, and the rest from an available balance of \$577,580 left from former appropriations. Miscellaneous expenses during the year amounted to \$13,593.

For works of improvement during the year there was expended \$68,061, and for maintenance \$396,409. There was an unexpended balance July 1 of \$370,703, but outstanding liabilities of \$31,709.

Captain Lukesh calls attention to the fact that navigation was re-established between St. Louis and points on the Missouri river as far as Kansas City during the year by the Kansas City Transportation & Steamship Co.

GREATER HARBOR AT SAN FRANCISCO.

Col. W. H. Heur, United States army, and Luther Wagoner, who are the engineers in charge of plans for a greater harbor at San Francisco, have submitted a report to the governor of the state, the mayor and board of harbor commissioners, in which they recommend improvements to the extent of \$43,284,195 and the issuing of 75-year bonds instead of the customary 20-year ones.

The recommendations include the removal of the harbor line bayward 150 ft., thus adding 143 acres of warehouse space and increasing the berth facilities—at present there are but 8.3 miles—to 47 miles.

It is also suggested that an effort be made to purchase Yerba Buena Island from the government and level it off, creating 600 acres which might be utilized for railroad terminals.

GOVERNMENT WORK ON LAKE ERIE.

Lieut.-Col. John Millis has recently submitted a report of river and harbor improvements for the Cleveland district, comprising the harbors of Toledo, Port Clinton, Sandusky, Huron, Vermilion, Cleveland, Fairport, Conneaut and the Black River at Lorain, to the chief of engineers of the United States army, for publication in his annual report.

The more salient features of Lieut.-Col. Millis' report follow:

TOLEDO HARBOR.

No contract work has been done at Toledo during the fiscal year 1908.

During the past year the United States dredge Burton excavated 20,549 cu. yds. from the Maumee river between Magnolia and Ash streets, and 381,979 cu. yds. from the inner division of the straight channel, at a field cost of \$26,356.67 for the maintenance of the channel. On June 30, 1908, the maximum draught that could be carried over the shoalest portion of the channel was 20 ft.

There has been expended at Toledo under previous projects the sum of \$1,617,695.45, while under the present project the expenditures to June 30, 1908, amount to \$903,022.75, making a total of \$2,520,718.20 expended in the improvements to the harbor at Toledo.

IMPROVEMENTS AT PORT CLINTON.

Under a contract with the Buckeye Contracting Co., of Cleveland, for stone reinforcement and repair of jetties, work was begun Jan. 1, 1908, and completed March 21, 1908, at a cost of \$2,919.48.

Use has been made of the land owned by the government and upon which storehouse and ways for repair of vessels have been established—for making necessary winter repairs to the United States dredge Maumee, tug Spear and one derrick scow. Two 500-yd. dump scows, work on which was begun during the previous fiscal year in the Port Clinton yards, were completed in October and November of 1907, respectively.

The total expenditures for this harbor were \$2,999.29.

SANDUSKY HARBOR.

Work at this port under a contract with the Great Lakes Dredge & Dock Co., Chicago, for dredging in the straight channel and the east and west dock channels, was completed on Oct. 1, 1907, at a total cost for the fiscal year 1908 of \$42,685.81. The total cost to date of this improvement has been \$246,643.44.

The work of deepening and widening the channel is being carried on

under a contract with the Great Lakes Dredge & Dock Co., for removal of bed rock and overlying materials in the east and west dock channels. The total cost of this improvement, which was begun within the present fiscal year, has been to date \$31,199.15, and the work is 36.1 per cent completed.

The government dredge Maumee worked from July 1 to Aug. 19, 1907, shipping bed rock and casting over stone in the prolongation of the east jetty. This work was done at a cost of \$4,073.65.

The total expenditures for this harbor for the fiscal year 1908 were \$100,348.03.

HURON HARBOR.

At the close of the last fiscal year work was in progress and 48 per cent completed under a contract with the Hunkin Bros. Construction Co., Cleveland, O., for constructing concrete superstructure on two new pier heads, 240 lin. ft. of new jetty and 342 ft. of old jetty; for constructing 1,800 lin. ft. of rubble mound jetty and for sheathing 342 lin. ft. of old jetty. Work under this contract was completed May 19, 1908, the total expenditure for the fiscal year 1908 having been \$88,202.08 and for the entire undertaking \$161,661.03 was expended.

The United States dredge Maumee began work May 11, 1908, to remove old east pier and dredge the sheltered area in accordance with approved project. To date the old east pier has been removed to a point about 200 ft. north of the shore line, as far as it is at present intended, and a total of 26,783 cu. yds. of material have been excavated from the basin and the old pier, at a cost of \$3,384.85, or about 12½ cents per cubic yard.

The total expenditures at this port for the fiscal year 1908 were \$118,549.77.

VERMILION HARBOR.

Under a contract with the Buckeye Contracting Co., Cleveland, O., for reinforcing and repairing jetties, work was commenced Aug. 21, 1907, and finished Dec. 20, 1907. The total cost of this work was \$13,843.05.

Expenditures at this port for the fiscal year 1908 amounted to \$14,968.62.

BLACK RIVER, LORAIN HARBOR.

Work is being done at this harbor under a contract with Patrick Keohane, of Fayetteville, N. Y., under a contract dated Oct. 27, 1900, for constructing west breakwater, two pierheads and removing and rebuilding parts of the east and west piers, and also under a second contract with the

same party dated Aug. 3, 1904, for constructing the east breakwater.

Under the first of these contracts the west breakwater was completed as modified by supplementary agreement dated April 12, 1907; the west pierhead was completed and the work of placing the concrete superstructure on the east pierhead was commenced; the work of removing and rebuilding parts of east and west piers was completed prior to the beginning of the present fiscal year.

At the present time the contract is 95 per cent completed.

The work of constructing the west breakwater, two pierheads and removing and rebuilding parts of east and west piers required an expenditure during the fiscal year 1908 of \$56,248.70 and a total expenditure to date of \$400,839.92.

Under the contract of Aug. 3, 1904, with Patrick Keohane, for the construction of the east breakwater, work has advanced until a section of 1,300 ft. has been completed. The remainder, 200 ft., has been completed to an elevation of —8 ft.

This contract is 85 per cent completed. The expenditures thereunder for the fiscal year 1908 were \$10,633.52 and the total expenditures to date \$115,750.24.

The work of reconstructing parts of the west pier, being carried on under contract with the Buckeye Contracting Co., of Cleveland, was completed Jan. 31, 1908.

At the close of the last fiscal year the work was 67½ per cent complete. The remainder of the work was done during the early part of the present fiscal year.

Expenditures under this contract for the fiscal year 1908 were \$9,546.82, and the total expenditure to date \$39,251.76.

Total expenditures for improving Lorain harbor during fiscal year 1908 were \$108,291.91.

CLEVELAND HARBOR.

The work of improvement to the main entrance of Cleveland harbor is being done under a continuous contract with the L. P. & J. A. Smith Co., of Cleveland.

The work is now 87½ per cent completed. The two pierheads at the new entrance are entirely finished; the west breakwater is complete; the east breakwater is finished for 370 ft. and built up to mean lake level for its entire length, 50 ft. being completed.

Expenditures for the two pierheads complete for the fiscal year 1908 were \$208,250.44, and the total expenditure

to date for the two pierheads has been \$572,696.08.

The work for the improvement and enlargement of Cleveland harbor by extending the main breakwater eastward, is being done under contracts for the eastern and western divisions, the western division being about 97 per cent, the eastern division about 62 per cent, and the whole work about 73¼ per cent completed. The total expenditures under this contract for the fiscal year 1908 were \$281,001.89, and the total to date is \$1,937,210.50.

During the storm which occurred on Lake Erie Oct. 26, 1906, a considerable settling was observed in the completed portion of the new rubble mound east breakwater. The principal settlement occurred in the first two 1,000-ft. sections, where sand had been used in large quantities as core filling. A board of engineer officers appointed to consider this matter approved, by report dated March 23, 1907, of the modification in the cross section suggested by the district officer, which was to abandon the use of sand and shale as a core filling and to complete the structure entirely of quarry-run stone containing not more than 25 per cent of stones weighing less than one ton and having an outside covering 5 ft. thick, composed of stones weighing not less than three tons each, set with their greatest dimensions into the work.

At the time the change was made about 2,000 ft. of the breakwater had been completed in accordance with the original plans and 1,000 ft. additional was nearly completed.

The condition of the work is approximately as follows:

The first, second, third and fourth 1,000-ft. sections are complete; the core has been built up to within about one foot of the water surface in the fifth, sixth, seventh, eighth, ninth and tenth sections; covering stone has been placed on both lake and harbor sides up to —5 feet in the fifth section and a small portion of the sixth.

The improvement of Cleveland harbor by dredging is being carried on under a contract with the Great Lakes Dredge & Dock Co. The work consists of dredging to a depth of 25 ft. the north half of the west basin, the channel between the main entrance and the Lake Shore railway bridge, and so much of the east basin as the funds available will permit.

The total expenditures under this contract for the fiscal year 1908 were \$77,671.68, this being the year in which the work was begun.

Work under contract with the L.

P. & J. A. Smith Co., Cleveland, for improving Cleveland harbor by dredging was completed July 20, 1907. The total expenditure on the above improvement for the fiscal year 1908 has been \$3,850.34, while the total to date is \$146,676.23.

Expenditures for improvements to Cleveland harbor may be summarized as follows:

Under contracts, etc., authorized by act of June 3, 1896, \$3,872.87.

Maintenance (dredging) and continuing improvement, \$101,881.42.

New entrance, breakwater construction, etc., acts of June 13, 1902, March 2, 1907, \$499,284.54.

FAIRPORT HARBOR.

Work was completed July 31, 1907, under a contract with the Federal Contracting Co., of New York, for constructing shore end of west breakwater. This work consisted of joining the inner end of existing timber crib west breakwater with the shore by means of a rubble mound structure 1,500 ft. in length. The total expenditure under this contract for the fiscal year 1908 was \$7,357.52, and the total expenditure to date thereon has been \$92,152.86.

The completed portion of the west breakwater is being extended seaward under contract with the Sea Coast Construction Co., of New York. This contract contemplates the construction of a stone-filled timber crib pierhead 50 ft. square, with a concrete superstructure, to be built on the east side of the harbor entrance, and the construction of so much rubble mound breakwater required for connecting this pierhead with the existing timber crib breakwater as funds available will permit.

Work under this contract is just begun and a small amount of subaqueous construction only has been built. The total cost under this contract for the fiscal year 1908 was \$6,976.50.

The shoaling of the outer bar at the harbor entrance was twice removed during the year by the United States dredge Burton, a total of 19,168 cu. yds. being removed at a cost of \$1,246.15.

The total expenditures for improving Fairport harbor, during the fiscal year 1908, were \$30,570.94.

ASHTABULA HARBOR.

Work at Ashtabula has been advanced 15 per cent during the present fiscal year and it is believed that this contract will probably be completed during the present working season. Under this contract the pierheads and 500 lin. ft. of the west breakwater have

been completed and the remaining 700 ft. varies in height from 0 to 5 ft. above water surface.

Expenditures under this contract during the fiscal year 1908 were \$56,783.01 and the total expenditures to date have been \$375,717.81.

A contract with the Federal Contracting Co., of New York, for constructing the shoreward end of the west breakwater was completed June 6, 1908. This work consists of 1,300 lin. ft. of rubble mound construction on the line of prolongation of the existing west breakwater from the inner end of the present timber crib work.

The total expenditures under this contract for the fiscal year of 1908 were \$55,241.14, and the total expended to date is \$141,226.70.

In 1904 the secretary of war under authority of law gave permission to the Pittsburg, Youngstown & Ashtabula Railroad Co. to completely remove the west jetty and to replace the same by a bulkhead 60 ft. farther to the west, thus increasing the width of the channel. Under authority granted by this permit the railroad company has practically completed its fill on the lake front, protecting the fill on the north side by a wall of rip rap and has completed a new dock on the lake front west of the channel, 1,000 ft. long, and the sea wall to the westward about 1,200 ft. long to protect the new dock; the new slip is now being dredged to 21 ft.

In May, 1906, authority was also granted to the Lake Shore & Michigan Southern Railway Co. to make some improvements on the westerly side of the river. The railway company is to take possession of the east pier and to extend it northward 720 ft. Thence there will be an extension of about 900 ft. easterly, thence southward to meet the property of the railroad company. The inclosure is to be filled to the level of the dock. The government east breakwater will afford but partial protection to these new docks. The railway company has been authorized to extend the east breakwater to protect the docks on the easterly side. Work on this improvement was begun in 1906 and has been continued since.

The railway company has extended east pier 720 ft. and thence easterly about 900 ft. and southerly to a point meeting their property and has filled the space, reclaiming about 15 acres of land. The old opening of the Minnesota slip has been closed and the easterly side of the slip has been extended to the established harbor lines, about 3,350 ft. of crib work being

completed and about seven acres having been filled in to the eastward. A sea wall at the easterly end of their improvements has been completed for 1,360 ft. The east breakwater extension has been completed for a distance of 1,100 ft. and the abandoned breakwater has been removed and the east basin and slip dredged to 23½ ft.

The total expenditures for improving Ashtabula harbor during the fiscal year 1908 were \$117,682.51.

CONNEAUT HARBOR.

The latest contracts in force for work in this harbor were completed during the previous fiscal year.

During the months from July to November, inclusive, 1907, minor repairs were made to the concrete superstructure of the east breakwater. The work was done by hired labor and the purchase of materials was made in the open market at a field cost of \$6,685.33.

Between May 22 and June 6, 1908, the United States dredge Burton removed shoals which had formed in channel and 16,242 cu. yds. of material were excavated at a field cost of \$1,055.89.

The total expenditure for improving Conneaut harbor during the fiscal year 1908, was \$9,006.27.

Reports on preliminary examinations and surveys required by the rivers and harbors act approved March 2, 1907, of the following localities within this district were duly submitted by the district officer. They were reviewed by the board of engineers for rivers and harbors pursuant to law, and were transmitted to congress and printed in documents as indicated:

1. Preliminary examination and survey of Maumee river from deep water in Lake Erie to the Fasset Street bridge, Toledo, with a view of obtaining greater depth and an increased width of approximately 100 ft. Reports dated Aug. 10, 1907, and Feb. 18, 1908, respectively, are printed in House Document No. 685, Sixtieth Congress, first session. The district officer submits an estimate of cost of \$400,000 to obtain a channel 400 ft. wide and 23 ft. deep, which will require the removal of 3,300,000 cu. yds. of material.

An allotment of \$300 was made for this survey from the appropriation for examinations, surveys and contingencies of rivers and harbors. The cost of the survey was \$300.

2. Preliminary examination and survey of Lorain harbor, including that portion of Black river from the inner end of the government piers to the East Erie Avenue bridge. Reports

dated June 17, 1907, and Aug. 23, 1907, respectively, are printed in House Document No. 560, Sixtieth Congress, first session. The district officer submits an estimate of cost in the sum of \$23,000 for enlarging that portion of Black river from the inner end of government piers to the East Erie Avenue bridge, in Lorain harbor, by widening the channel to the dock lines which have been established by local authorities, and providing a depth of 20 ft. below mean lake level.

An allotment of \$200 was made for this survey from the appropriation for examinations, surveys and contingencies of rivers and harbors. The cost of the survey was \$82.83.

Preliminary examination of Rocky River harbor, with a view to repairing existing structures and extension of the harbor. Report dated June 17, 1907, is printed in House Document No. 559, sixtieth congress, first session. It is deemed that neither the present commerce of this locality nor that reasonably prospective will justify the expenditure required for the repair of the existing structures.

EXPENDITURES, FISCAL YEAR 1908, CLEVELAND, OHIO, DISTRICT.

The total amount actually expended under the directions of the chief of engineers, in connection with the improvement of rivers and harbors, during the fiscal year ending June 30, 1908, for Cleveland, Ohio, district, is as follows:

Improving harbor at Toledo, O....	\$ 40,576.38
Improving harbor at Port Clinton, O.	2,999.29
Improving harbor at Sandusky, O.	100,348.03
Improving harbor at Huron, O.	118,549.77
Improving harbor at Vermilion, O.	14,968.62
Improving harbor at Lorain, O.	108,291.91
Improving harbor at Cleveland, O.	
For general improvement	\$105,754.29
For main entrance and new breakwater.....	499,284.54
	605,038.83
Improving harbor at Fairport, O.	30,570.94
Improving harbor at Ashtabula, O.	117,682.51
Improving harbor at Conneaut, O.	9,006.27
	\$1,148,032.55
Examinations, survey and contingencies of river and harbors.	
For survey Maumee river.....	\$300.00
For survey Lorain harbor	82.83
	382.83
For removing sunken vessels or craft obstructing or endangering navigation (indefinite).	
For wreck steamer Mc-Cormick	\$293.73
For wreck dump scow in Black river	728.85
	1,022.58
Total expenditures, Cleveland district	\$1,149,437.96

The bid of the Craig Ship Building Co., Toledo, O., for the purchase of the United States revenue cutter Dallas, amounting to \$2,100, has been accepted by the secretary of the treasury.

ATLANTIC COAST GOSSIP.

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

The steamship Gothland, the latest addition to the fleet of the Red Star line's Antwerp-New York service, arrived at New York on July 22, on her maiden voyage to the port. The Gothland was built to the order of the White Star line for the Australian and New Zealand trade, and, as the Gothic, chartered to the Shaw, Savill & Albion Co. She was altered and refitted for the Red Star third class service at yards of the Harland & Wolff Co., Belfast, running a successful trial trip on March 17. The Gothland was built by Harland & Wolff, is about 7,800 tons and propelled by twin screws. She has accommodation for some 1,800 passengers, all of whom will be transported in four-berth rooms. There are large dining, smoking and sitting rooms, and a commodious promenade deck.

After Nov. 1 the Cunard line will discontinue the Wednesday sailings from New York and Liverpool until next spring, and run the regular Saturday service only. The Mauretania and Lusitania will be withdrawn from the service for two months, during which period they will undergo a thorough overhauling and be placed in readiness for an early start in 1909. The services will be performed by the Lucania, Campania, Carmania, Umbria and Etruria. The Caronia will be placed in the Mediterranean run during the winter months.

The British steamship Skipton Castle, which put into Norfolk last week with her cargo afire, after being pronounced seaworthy proceeded on her voyage. Eighty-two bales of cotton were discharged from the vessel, 50 of which were badly burned.

The steamship Bermudian, of the Bermuda line, returned to her West Indian port, two hours after sailing for New York, to turn over to the authorities a deserter from the British army who had stowed away on the vessel. The vessel, accordingly, was delayed about four hours by the incident.

The president's yacht Mayflower, in a dense fog on the night of July 21, ran down the lumber-laden schooner Menawa, while the schooner was bound from Machias to New York. The crew of the Menawa, which was owned by C. G. Pendleton, of Islesboro, Me., were taken on board the

yacht, and, later, presented to the president.

A suggestion to combine the Russian and Scandinavian steamship service to America, absorb all those lines into a new company and build several new vessels is now under consideration, the suggestion being in connection with the proposed Norwegian and American service.

The Atlantic transport liner Minneapolis arrived at New York this week reporting a near-encounter with a whale. A *New York Times* scribe has the explanation from the captain that the narrowly-avoided collision was due to a misunderstanding of signals, the captain having blown twice and the whale once.

The North German Lloyd, for the better accommodation of the traveling public, has arranged direct connection between the steamships from New York and its East Asiatic imperial mail service for the far east at Naples.

The Boston & Cuba Steamship Co. will inaugurate their service between Boston and Havana with the sailing of the *Talisman*, on July 31. Sailings will be monthly, on the last day of each month, and will be increased as necessity arises.

The Ward line steamship Morro Castle, which arrived at New York on Monday, reported having sighted the Norwegian steamship *Deramore* still fast on the east coast of Florida. The *Deramore* went ashore at Hillsboro Inlet light, about 10 miles from Fort Lauderdale, with a cargo consisting of 2,800 tons of bituminous coal, one locomotive, 1,300 cases of powder and 300 cases of dynamite. Wreckers are at work on the vessel.

The Dutch steamship *Prinz Wilhelm II*, from Paramaribo, has reported sighting the unknown wreck adrift off the New Jersey coast, and which, despite the efforts of revenue cutters and other government vessels cannot be located. The wreck, according to the report, is that of a schooner or barge, and shows part of two masts. On July 24 it was $9\frac{1}{2}$ miles east-northwest $\frac{1}{2}$ east of Barnegat light-house.

The steamer *Maine*, while bound up Long Island Sound on Saturday, collided with and sank the schooner

Charles Woolsey. The *Maine's* bow was badly damaged, and the schooner, a two-master, was cut in two. The accident occurred at a point about half way between Horton's Point and Cornfield lightship in a dense fog. The master and crew of the schooner, numbering four all told, were taken on board the *Maine*.

The ship *Atlas*, after a run of 106 days from the Hawaiian Islands, has arrived at Philadelphia with 50,000 bags of sugar.

The steamer *Colon*, of the Panama Railroad Steamship Co., has been placed on the New York and Cristobal route while the *Panama* is being repaired and overhauled at Philadelphia.

The steamer *Ohio*, of the Furniss Withy line, while bound from Rotterdam to Baltimore, passed a large iceberg in latitude 49.10, longitude 48.20, on the morning of July 20.

In the rush hour previous to the sailing of the Cunard line steamer *Caronia* last Saturday no little notice was taken of the fact that the purser was getting considerable assistance from a young lady stationed near his desk. Purser and ship's clerks will be relieved to know that the young lady in question, however, is merely the typist and stenographer of the vessel. And, by the way, it is pointed out that a female purser will not cut much of a figure in the smoking room, and would find other of the traditional duties of the purser objectionable.

Two passengers arriving at New York this week on the Austro-American liner *Martha Washington* had, among other articles of baggage, a number of mattresses. The mattresses, according to the owners, were to be used as part of the equipment of a new boarding house. The suspicions of the custom house officers being aroused investigation was made, with the result that lace, silk and other valuable material was found to form the stuffing of the mattresses, a fact the owners had probably forgotten. About \$5,000 worth of the valuable stuffing was brought to light.

The steamer *H. P. McIntosh* which was sunk in collision with the steamer *M. A. Hanna* off Port Huron has reached Cleveland and will be placed in No. 1 dry dock as soon as her ore cargo is discharged at the Erie docks.

ITEMS OF GENERAL INTEREST.

The steamer *Harvey D. Goubler* left Lorain on July 25 on her first trip of the season.

A patrol boat will be stationed in the new West Neebish channel when it is opened next week.

The fire tug ordered by the Duluth, Mesabi & Northern railway will be built at the Lorain yard of the American Ship Building Co. and will be named in honor of Wm. A. McGonagle, first vice president and general manager of the railway company.

The steamship *St. Louis* of the American Line while passing the banks of Newfoundland recently ran down and cut in two a 60-ft. whale which had been racing with the vessel for over an hour. The monster was one of a school which had been following the *St. Louis* for some distance.

Two deserters from the United States naval training ship *Constellation* were arrested recently at Chicago when a detective overheard them rehearsing their grievances. They gave as their chief reason for running away the fact that they were never permitted to have lemon pie. When apprehended in a Clark street restaurant they were gorging themselves on the forbidden dainty.

Rear Admiral W. S. Cowles, chief of the navy bureau of equipment and brother-in-law of President Roosevelt, left Newport this week on the battleship *New Hampshire* and set sail for Quebec to represent the United States at the celebration of the founding of that city. On this trip Admiral Cowles will fly his flag for the first and last time as a flag officer, for he will be retired next month. Vice President Fairbanks will represent the United States government at the celebration, but he will proceed to Quebec by rail.

Capt. Robert McDowell, master of the steamer *Alexis W. Thompson*, has made a report which government officials at Detroit are now investigating. His report states that while coming down the river July 21 a car ferry steamer, thought to be the *Detroit*, backed out of her slip on the Canadian side of the river. She blew two whistles intending to cross the bow of the *Thompson*. Capt. McDowell blew danger whistles and answered with one whistle. The car ferry answered with danger signals and continued to cross the bow of the *Thompson*. Capt. McDowell immediately backed full speed and only missed the car ferry by 50 ft. He says in his report that had not the *Thompson* been running under check a collision could not have been averted.

LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY R. CURR.

Fig. 34 shows a double butt strap arrangement instead of the lap shown on Fig. 33.

The area of section through the rivet holes XX is equal to a tensile strength of 3,146 tons.

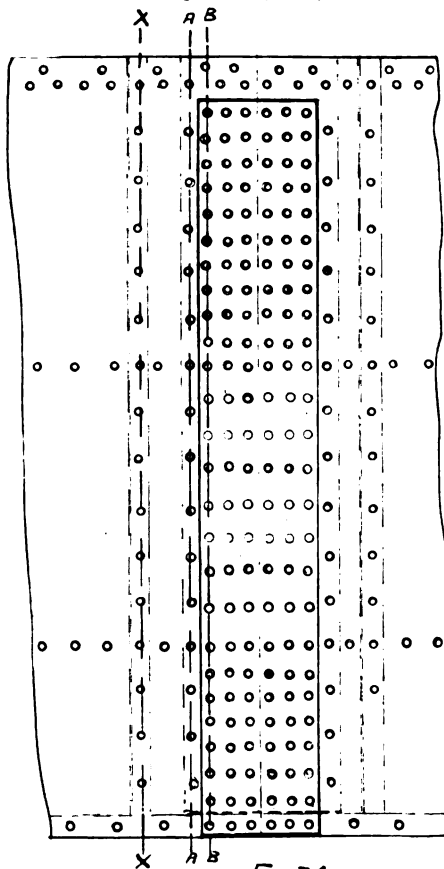
In this arrangement of double strap there are 98 rivets 1 in. diameter; 78 of these rivets are in double shear and have a value of 36 tons each. The balance, 20 in number, are in single shear and have a value of 20.4 tons.

The rivets equal $78 \times 36 = 2,808$ tons.
The rivets equal $20 \times 20.4 = 408$ tons.

Value of rivets = 3,206 tons.
 $3,206 - 3,146 = 60$ tons in favor of the rivets.

In example of Fig. 33, there are 155 rivets, all of single shear.

In this example, Fig. 34, there are



— Fig. 34 —

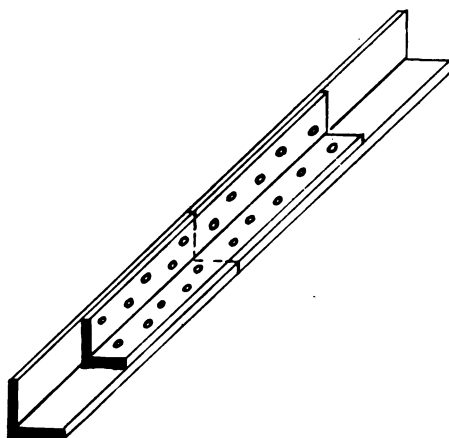
98 rivets on each side of the butt, making 196 rivets in all and 41 rivets more than in the lap butt. The riveting for three thicknesses of material is more expensive than two thicknesses and one can see that the double strap arrangement is more elaborate than the lapped single plate arrangement.

The considering of the butt strap

thicknesses is important as explained in previous articles.

3,146 tons tensile strength has to be made up in the two straps.

The lower or bottom strap through the line AA is equal to $116\frac{1}{2}$ in. and 20/32 thick.



— Fig. 35 —

Across line AA, Fig. 34, there are 16 rivet holes and are equal to 16 in. $116\frac{1}{2} - 16 = 100.5 \times 20/32$ in., and equal to 62.81 sq. in.

The top strap has a close pitch of rivets through the line BB which are countersunk decreasing the area of the material in the butt strap through this section.

The length of the top butt strap on line BB is 113 in. and the reduction for rivet holes 26 in number leaves 80 in. of material in the butt strap.

To find the thickness necessary for the top butt strap the top and bottom butt straps must be added together and compared with the section through XX in tons tensile strength.

The bottom strap is 62.81 sq. in. and has a tensile strength through AA of 26 tons per sq. in. and equals $62.81 \times 26 = 1,633.06$ tons. $3,146 - 1,633.06$ leaves 1,513 tons to be made up in the top strap material.

$1,513 \div 26 = 58.2$ sq. in. at 26 tons per sq. in., but as the value of the material through the line BB, Fig. 34, is only equal to 24 tons, the material must be increased in thickness to gain the difference.

Example: $1,513 \div 24 = 63.05$ sq. in. required to make the two straps equal to the area of section XX. $63.05 \div 80 = 0.8$ in. thickness of top butt strap. $80 \times 0.8 = 64$ sq. in. $64 \times 24 = 1,536$ tons tensile strength of top butt strap.

$1,536 + 1,633.06 = 3,169.06$ tons tensile strength of the two butt straps. The area of section of the butt straps exceeds the area of section through

the line XX by 23.06 tons under tension. This example shows that the material in the butt straps and rivets exceeds the material through line XX, but there is a possible chance of fracture through the line BB weakened by the close pitch of rivet holes.

Through the line BB, Fig. 34, the strength of the stringer plate is reduced by punching 28.7 in., which has to be assisted by the rivets of the outside row in the bottom strap AA to overcome the difference.

Example: The plate through the line BB is 120 in. and there are 27 rivet holes punched through this line, reducing the material in the plate to 92.3 in.

$92.3 \times 39 \div 32 = 112.46$ sq. in. $112.46 \times 24 = 2,799.04$ tons tensile strength of plate through line BB. In this case the rivets through the line AA must be considered. There are 16 rivets and each has a value of 20.4 tons, making a total of $20.4 \times 16 = 326.4$ tons. $2,799.04 + 326.4 = 3,125.44$ tons, being 21 tons weaker than through the unavoidable weakest section. The plate would break through the line BB and shear the rivets AA before it would fracture at XX.

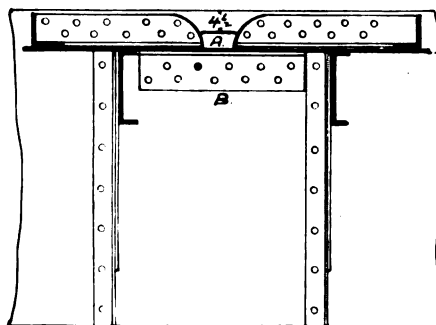
All calculations should be made for the fracture to come on XX so that one rivet would have to be rearranged in this butt arrangement in order to get that result.

Fig. 35 shows an arrangement of the stringer angle butt strap. There are 10 rivets 1 in. diameter and equal each to a shearing strain of 20.4 tons.

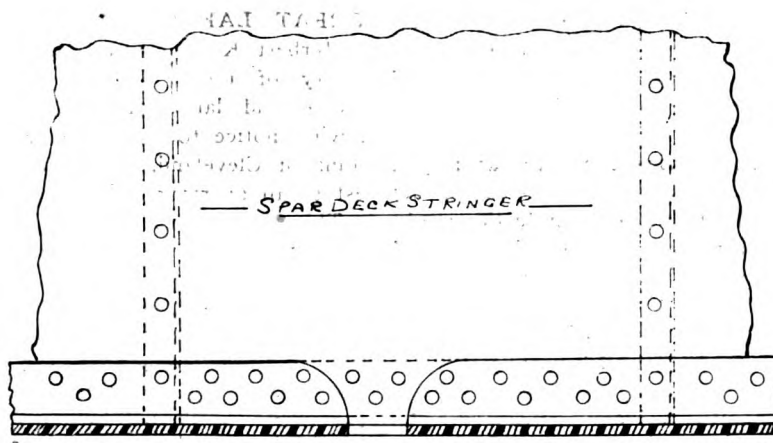
The flattened out angle 6 in. \times 6 in. \times $\frac{7}{8}$ would measure $10.25 \times \frac{7}{8}$ in. thick and making a deduction for two rivet holes would equal $10.25 - 2.12 = 8.13$ in.

$8.13 \times \frac{7}{8} = 7.11$ sq. in. $7.11 \times 26 = 184.86$ tons. $184.86 \times 20.4 = 9.05$ rivets necessary to compare with material in angle.

The thickness of the butt strap must be carefully considered to equal the



— Fig. 36 —



— Fig. 36a —

rivets and angle bar. The butt strap must come to the edge of the angle or nearly so.

In this case if flattened out the butt strap would measure 8 in.

8 in. — $2\frac{1}{2}$ in. for rivet holes would leave $5\frac{1}{2}$ in.

$7.11 \div 5\frac{1}{2} = 1.3$ thickness of material required for butt strap.

$5.5 \times 1.3 = 7.15$ sq. in. area of butt strap.

$7.15 \times 26 = 185.9$ tons.

A butt strap for an angle 6 in. x 6 in. x $\frac{7}{8}$ in. requires to be 5 in. x 5 in. x 1.3 in. thick.

Fig. 36 shows an arrangement where the bosom strap shown by Fig. 35 is dispensed with, also the scupper, Fig. 37, on upper decks.

Fig. 36 is a scupper arrangement and it has many advantages over the casting shown by Fig. 37.

The stringer angle stops at the edge of the hole A cut in the sheer strake, as shown by Fig. 36a, and saves labor in cases where the angles may be long and have to be chipped to make a close fit. There is only one hole cut in the plating instead of two shown by A and B, Fig. 37.

The two holes cut A and B, Fig. 37, does not in any way hurt the vessel's strength, seeing that seven holes are punched in the sheer strake, Fig. 36, and 16 in stringer, Fig. 34, amounting to $34\frac{1}{2}$ in.

There is a saving in labor and cast iron as shown by Fig. 37.

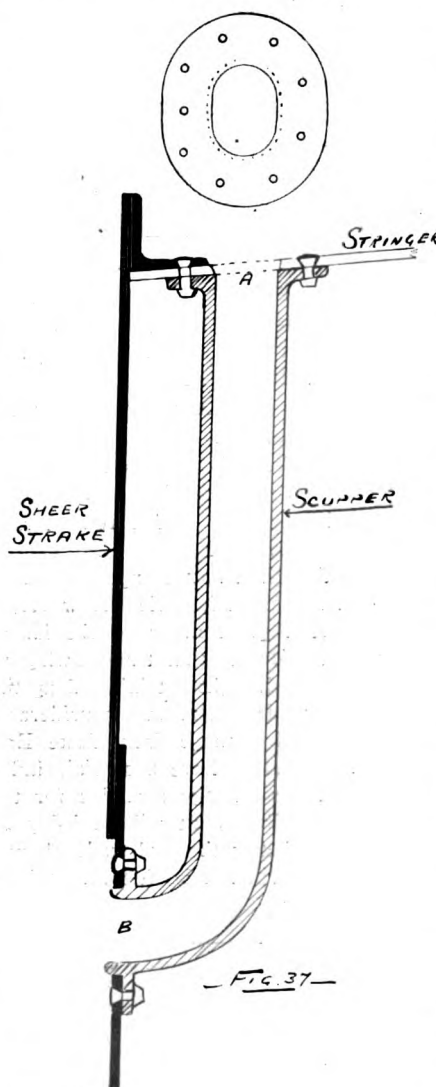
B, Fig. 36, shows the means taken to compensate for cutting the stringer angle short.

An angle of the same width is used for B as the top angle and a number of rivets equal in strength to the area of section of the angle is put in on each side of the compensating piece of the stringer angle B.

The hole A is $3\frac{1}{2}$ in. x 2 in. and the sheer strake above the hole is

$4\frac{1}{2}$ in., showing the sheer strake to be $\frac{1}{2}$ in. above the stringer angle. The punching of the stringer angle and sheer strake reduces the metal $2\frac{3}{8}$ in., which does not affect the sheer strake over the hole A.

The material in the angle above the hole amounts to $1\frac{1}{4}$ in. and in the sheer strake plate $1\frac{3}{4}$ in., so that the total material in angle and plate amounts to 3 in. to resist fracture,



— Fig. 37 —

while over the hole A there are $4\frac{1}{2}$ in. before fracture can occur.

The area of section of the stringer angle and sheer strake plate amounts to 3.09 sq. in. and the sheer strake plate above hole A equals $4\frac{1}{2}$ sq. in.

The scupper, Fig. 36, is in use on salt water and has been so for about 30 years.

OBSTRUCTIONS AT BUFFALO.

United States Engineer Fisk, at Buffalo, has notified the Lake Survey office of the location and manner of marking three obstructions in his district. The information is of importance to masters of vessels entering Buffalo and also those which may run on the Niagara river.

The sand scow Trader, sunk July 8, lies in the American channel of the Niagara river, 300 ft. west of the channel used by vessels, and abreast of the foot of Strawberry Island. The scow lies in 15 ft. of water, with 8 ft. over it; the mast of the derrick projects above the water 6 ft. It is marked at night by a white lantern light.

The intake crib for the Lockport water supply, now under construction at North Tonawanda, lies temporarily in Niagara river, to westward and abreast of the foot of Tonawanda Island. It is 1,000 ft. south, 17 degrees west, true, from the dredged channel south buoy, with 10 ft. of it above water. At night it is marked by a white lantern light.

The steel circular intake caisson for the Buffalo water supply, under construction at Buffalo, has been sunk in place, in Lake Erie, 300 ft. south of a line joining Buffalo breakwater north end light and Horseshoe Reef light, 1,000 ft. south, 53 degrees east, true, from Horseshoe Reef light, in 18 ft. of water. The caisson projects above the water 17 ft. and is painted black. It is temporarily marked at night by two white lantern lights on rods, 15 ft. above the water.

The steamer Wm. Rudolph, bound from Milwaukee to Chicago, blew out her cylinder head when a little to the north of Windmill Point July 27. She was towed to Milwaukee by the tug Dixon.

The Standard Contracting Co. has sent its dredge Continental to Cleveland, having completed a dredging contract for the B. & O. railway at Lorain. There is now a depth of 22 ft. in front of the B. & O. docks at that port.

PORT OF GARY OPENED.

The port of Gary was formally opened on Thursday last when the great bulk freighter E. H. Gary arrived from the head of the lakes with a cargo of 10,382 gross tons of ore. Every workman employed by the Indiana Steel Co. was at the docks to welcome the steamer. They made a solid line along the pier and cheered when Miss Mary Louise Gleason, the 14-year-old daughter of W. P. Gleason, superintendent of the company, ran up the American flag on the flag staff at the harbor entrance. The raising of the flag was the signal for a salute of 21 guns by the old gunboat Michigan, now the Wolverine. This was followed with salutes by the naval training ship Dorothea, the light house tender Sumac and the revenue cutter Tuscarora, which had conveyed her from the breakwater, South Chicago, 14 miles

spire general admiration for his largeness of view. He considered it a wonderful index of the prosperity of the country that a single company could in the space of two years conceive and construct a town as a part of the general ramifications of its business. He hoped that justice might be impartially administered in it and that labor and capital might live in amity, capital receiving a reasonable return for its enterprise and labor a just wage, sufficient for the workingman to maintain his family in comfort and to live under a roof that he might call his own. In his address he avoided all reference to politics, but in speaking of the great presidents of the United States he included Roosevelt.

This steel plant has been erected and a town founded about it in less than two years. It will eventually be-

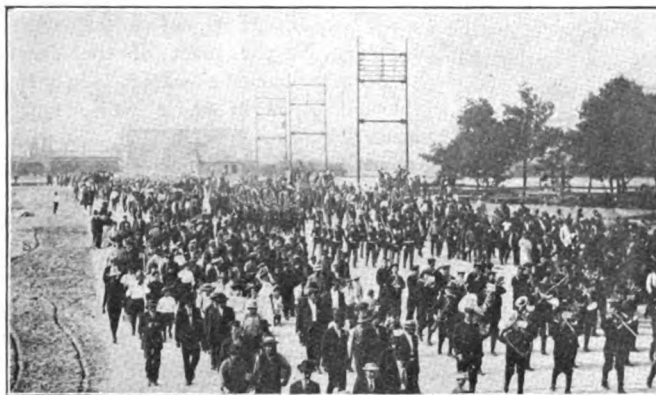
GREAT LAKES MOTOR BOATS.

Herbert Knox Smith, assistant secretary of the department of commerce and labor, has sent the following notice to the collector of customs of Cleveland, which is of interest to all operators of motor boats:

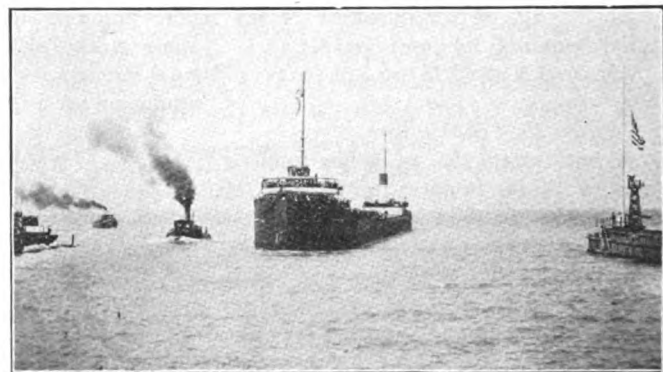
The department has received inquiries as to the equipment required by the act of Feb. 8, 1895, and section 4426 R. S., to be carried on small motor vessels. In order to secure uniformity in the enforcement of this law you are informed that small motor vessels navigated in your district should be equipped as follows:

WHISTLE AND BELL.

All motor vessels without regard to size or use, must be provided with an efficient whistle or siren; and an efficient bell. No size or style of bell is prescribed provided it is available and sufficient for the use for which



PARADE ON STREETS OF GARY.



ORE CARRIER, E. H. GARY, ENTERING HARBOR.

away. On board the Gary were representatives of manufacturing, commercial and banking interests of the west, the party in all numbering about 500. As soon as the harbor was reached the formal exercises began, the speakers talking from the steamer's bridge. The guest of honor was John W. Kern, of Indianapolis, Democratic candidate for vice president of the United States. Other speakers were James R. Mann and E. C. Crumpacker, members of congress from the Calumet district; Wm. Livingstone, of Detroit, president of the Lake Carriers' Association; President H. S. Norton, of the Gary Commercial Club; State Senator A. S. Bowser, of Indiana, and W. P. Gleason, of the Indiana Steel Co. After an inspection of the steel plant the guests were entertained by the Gary Commercial Club at the Gary Hotel. E. C. Collins, of Cleveland, represented the Pittsburg Steamship Co. at the ceremonies.

Mr. Kern's remarks were worthy of the occasion and were such as to in-

come one of the greatest ore receiving ports in the world. This year's receipts will not be large but they will be approximately 1,900,000 tons. Its normal annual business, however, will be in the neighborhood of 5,000,000 tons. Lake Michigan will therefore be in the course of a few years a formidable rival of Lake Erie in ore receipts, though it is not expected that it will ever surpass Lake Erie. However, it will divert a great many of the larger class of carriers to that trade, owing to the favorable draught obtaining along the entire route. It will mean a considerable subtraction of tonnage from Lake Erie and will therefore have a sensible influence upon the tonnage available for the coal trade. The result will probably be a firmer market in the coal trade, though its influence will not be felt for at least three years yet.

E. E. Lilley, engaged as government inspector on breakwater construction at Ashtabula, died there on July 25 after an extended illness.

it is intended. The word "efficient" must be taken in its ordinary sense, considered with reference to the object intended by the provisions in which the word appears, namely, the production of certain signals. The power to operate the whistle is not prescribed but the whistle is to be of such a character as to be heard in ordinary weather at a distance of at least two miles.

LIGHTS.

When navigated between sunset and sunrise they must carry regulation lights, namely:

1. A bright white light in the fore part of the vessel.
2. A green light on the starboard side and a red light on the port side provided with proper screens. The side lights may be so affixed to the coaming or to the sides of the deck house as to be properly screened, provided the lantern be backed with metal. When the green and red side lights cannot be fixed they must be kept lighted and ready for use as

provided by Rule 8 of the act of Feb. 8, 1895.

The law does not appear to permit the use of a three-color "combination" light.

COPIES OF RULES.

Such vessels are also required to have on board two printed copies of the rules which must be observed by them, which rules will be furnished by local inspectors of steam vessels on request.

LIFE PRESERVERS.

All such vessels under 15 tons engaged in carrying passengers for hire, in addition to the equipment above stated are required to carry one life preserver for each passenger carried and shall be operated only in charge of a person duly licensed by the local inspectors of steam vessels. Such vessels when used only as private pleasure boats and not at any time engaged in the carriage of passengers for hire are not obliged to comply with the provisions of law in regard to life preservers and licensed navigators. (The life preservers must be of the sort prescribed by the regulations of the board of supervising inspectors. They must bear the United States inspector's stamp.)

DOCUMENTING, INSPECTION, ETC.

All motor boats of over five net tons engaged in the carriage of freight or passengers for hire must be documented, viz.: Licensed by the collector of customs. (Vessels under five net tons cannot be documented in any case.) The license for the vessel obtained from the collector of customs (designated a document) is additional to and must not be confounded with the license required for the operator of a motor boat of less than 15 tons carrying passengers for hire.

Motor vessels of over 15 tons engaged in the carriage of freight or passengers for hire must also be inspected by the United States local inspectors of steam vessels.

Documented vessels must have name and home port on stern and name on each bow. Official measurement is necessary only in case of vessels requiring to be documented.

(Continued from page 33.)
to Frankfort, 18½ miles northerly, the lake shore is bold and wooded, and marked by many high hills ranging from 300 to 400 feet, the highest one being about 7 miles south of Frankfort.

556. The coast trends about NNW and is rugged. About nine miles north of White Lake are clay banks.

557. About a mile. There are no obstructions and the water is bold, especially where the land is high.

558. Pt. Betsie, Big Pt. Sable, Little Pt. Sable, White River, Kalamazoo and St. Joseph.

559. Between Milwaukee and Grand Haven.

560. Between Pt. Betsie and Cave Pt., north of Sturgeon Bay canal.

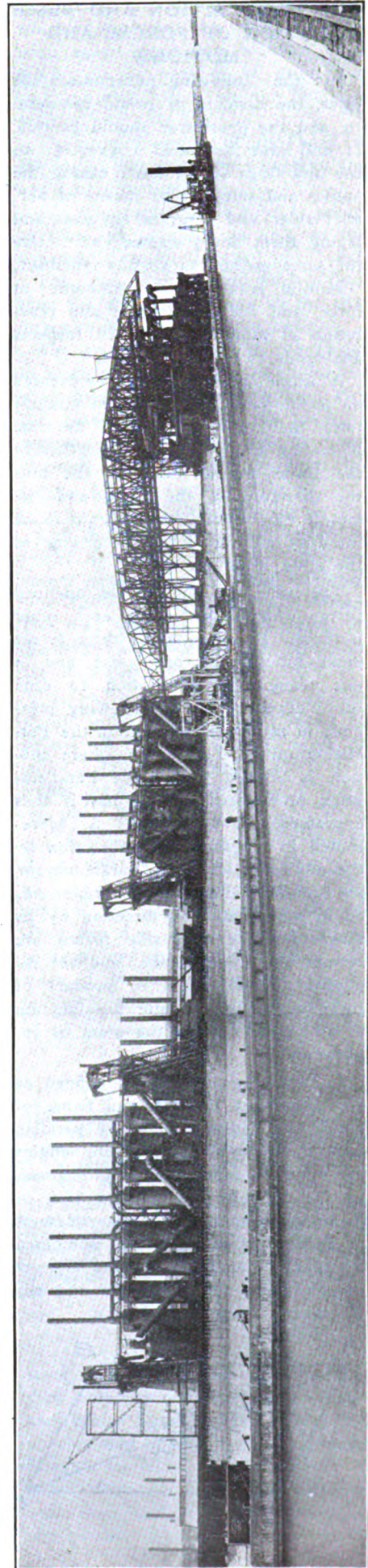
GALVESTON'S PROSPECTS.

There is a probability that the large new Mallory liner Brazos will be put in the Galveston-New York trade early in the fall, if the business which it is now believed is in sight actually warrants the use of the new vessel.

Since the opening of the Cuban trade Galveston has profited by millions of pounds of packing house products and other provisions which have been shipped to the island through that port and the rapidly growing trade has already necessitated several increases in the coast-wise fleets and it now seems to demand an increase in the size of the vessels to be used in taking care of the traffic.

Considerable activity has developed over the action of the New York chamber of commerce, which at a recent meeting adopted a petition to the state department asking that the matter of better protection of trans-Atlantic cables be taken up by the British board of trade. It is charged that the cables are constantly being damaged by deep sea steam trawlers. The British trade organizations are now taking the matter up and are asking that zones be established which shall include the sections traversed by cables, within which zones it shall be illegal to trawl. It is pointed out that the breaks in the cables are of such frequency that much of the time the capacity of the cables is reduced one-half. The damage is clearly from the stated cause as has been proved by the marks found upon the broken portions as well as by the finding of parts of nets adhering to the cables.

The New York & New Haven Transportation Co.'s New Bedford line steamer Maine parted her steering gear recently while on her way out through Hell Gate. The boat's momentum carried her to a safe anchorage clear of the jagged rocks which abound at this point where she awaited the arrival of two tugs which pulled her out safely.



FIRST BATTERY OF COMPLETED FURNACES AT GARY.

THE COMPOSITION AND RESOLUTION OF FORCES AND MOTIONS.

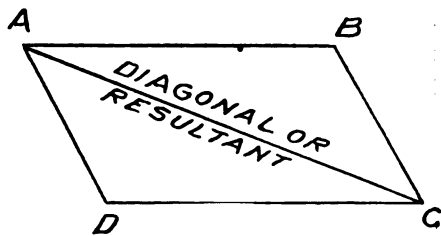
In the following exercises, the ruler, the dividers or pencil compasses, and the protractor should be used. It will also be found convenient to use any large scaled chart, taking the angles and sides off by means of parallel ruler and diagram compass and laying them down on the chart. Use the same method as already explained:

Motion is the direct outcome of force, and the composition and resolution of motions are in all respects analogous to those of forces.

A single force may be represented on paper by an arrow-headed straight line; the commencement of the line indicating the point of application of the force—the direction of the line, the direction of the force—and the length of the line, the magnitude or intensity of the force, according to the scale made use of.

The smallest number of inclined forces which can balance each other is three. To do so, these three forces must act through one point, and in one plane. Their relation to each other depends on the following principle in mechanics, known as the Parallelogram of Forces, or where motion is alluded to, as the Parallelogram of Velocities. The law is thus expressed. If two forces be represented in magnitude and direction by the adjacent sides of a parallelogram, an equivalent force will be represented in magnitude and direction by its diagonal. The two side forces are termed the Components; and the diagonal, the Resultant or product of their joint effect; while the junction of all three is called the point of application.

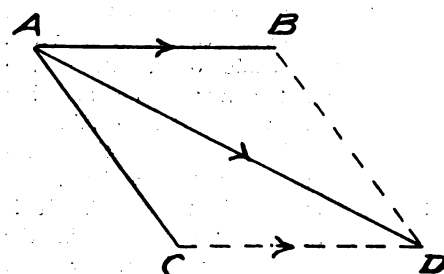
A Parallelogram may be defined as any four-sided straight-lined figure of which the opposite sides are parallel, and the diagonally opposite angles are equal to each other; its diagonal, as the straight line joining two of its opposite angles. Thus a square is a Parallelogram, and the subjoined Rhomboid is another. There are yet two, namely, the Rectangle and the Rhombus. (See Arithmetic.)



Thus the side AB is parallel to the side DC; and AD is parallel to BC. The angle A is equal to the angle C; and B is equal to D; while AC is the diagonal. If AB and AD be taken as two forces, A will be their point of application.

In any parallelogram the four angles amount to four right angles, or 360° ; and from the fact above stated, that any two diagonally opposite angles are equal to each other, if one angle be given, the other three can readily be found. Thus, if the angle D be 116° , the angle B will also be 116° . These two added together, and subtracted from 360° , leave 128° as the sum of A and C; and as these are also equal to each other, their values must be respectively half of 128° , or 64° .

Any convenient unit of length may be chosen to represent any unit of velocity, but, when the scale has been determined, it should not be changed in any given discussion. For example, two motions, one having an easterly direction and a magnitude of 10 yds. per second, and the other having a southerly direction and a magnitude of 15 yds. per second, may be fully represented by a horizontal line 2 in. long and a vertical line 3 in. long, the chosen scale of magnitude being 5:1; that is, each inch of the length of either line representing a velocity of 5 yds. per second. In indicating a line by the letters at its extremities, the order of the letters is that in which the line is to be drawn.



Parallelogram of Forces.—In the diagram, let AB and AC represent two forces acting upon the point A. Draw the two dotted lines to complete the parallelogram. From A, the point of application, draw the diagonal, AD. This diagonal will be a complete graphic representation of the resultant. If two forces, such as those represented in the diagram, act simultaneously upon a body at A, that body will move over the path represented by AD, and come to rest at D. The process is very similar to the composition of motions.

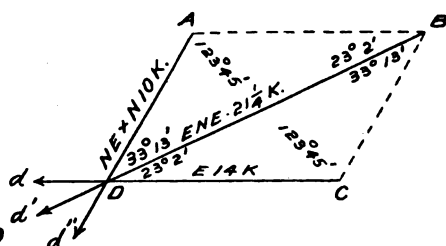
When the included angle, as BAC,

is a right angle, the resultant line is the hypotenuse of a right-angled triangle, and its magnitude will be the square root of the sum of the squares of the components. When the components are equal, and include an angle of 120° , the resultant divides the parallelogram into two equilateral triangles, and is equal to either of the components. In other cases the magnitude of the resultant may be determined by a careful construction of the parallelogram and a careful measurement of the diagonal.

Examples of the composition of motions, and the parallelogram of velocities:

In the following figure let DC represent the course and hourly speed of a steamer; say due east, 14 knots; and let AD represent the true direction of the wind, and its hourly velocity, say NE by N 10 knots.

If the atmosphere were calm, the wind caused on board the vessel by her onward progress would appear to come from right ahead at a rate exactly equal to her speed; therefore the line CD may be taken to represent a wind blowing in the direction of the arrow with a velocity of 14 miles per hour. The AD and CD are the two components of the resultant BD, which latter shows the apparent direction and velocity of the wind as felt by an observer on the deck of the vessel, namely: ENE, $21\frac{1}{4}$ knots; this result being due to the combined directions and velocities of the true wind and that produced by the motion of the steamer.



SCALE $\frac{1}{8}$ INCH TO THE MILE.

This will be understood from the following consideration:

The United States hydrographic office has called the attention of shipmasters co-operating with them to the importance of this matter. The office has found it a difficult matter to plot simultaneous observations of a meteorological nature turned in by the masters of several vessel in the immediate vicinity of each other, but sailing different courses, because of a discrepancy of several compass points in respect to direction, and equally as marked a discrepancy in respect to

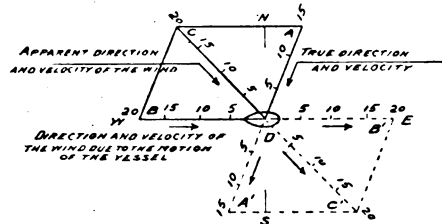
force. This is notably frequent when the wind is light and the speed of the vessel is high.

With fresh or strong winds it is frequently quite possible to determine the direction (but not the force) from the sea or lower clouds. With light winds, however, as well as at night and during foggy weather, this method fails.

To show how utterly the unassisted judgment of the observer may be at fault in estimating the force of the wind, assume the latter to have a velocity of 20 miles per hour (force 4) and take the case of two vessels, each steaming 20 knots, but in opposite directions, the first with the wind dead aft, the second with the wind dead ahead. The former vessel will be moving with the same velocity as the air and in the same direction. The relative velocity of the two, i. e., the apparent force of the wind, will thus be the difference of the two velocities, or zero, and on the deck of the vessel an apparent calm will prevail, the pennant hanging up and down. The latter vessel will be moving with the same velocity as the air, but in the opposite direction. The relative velocity of the two will thus be the sum of the two velocities, or 40 miles per hour (force 8), and on the deck the wind will apparently have the force of a fresh gale.

Decidedly the most accurate method of determining the true direction and force of the wind, and the method recommended to the observers of the hydrographic office for use under all circumstances, is by the resolution of the apparent force and direction into its two components, one of these being the known course and speed of

the vessel, the other the required true direction and force of the wind. To illustrate this method, take the case of a vessel steaming due west at a speed of 20 knots (see diagram) and let the apparent direction of the wind as observed on the deck of the vessel



be NW, its apparent force 4 on the Beaufort scale, corresponding to a velocity of 20 miles per hour. Under these circumstances the true direction of the wind will be NNE, and its true velocity 15 miles per hour, or force 3 on the Beaufort scale. To understand how this result is obtained it is only necessary to watch the smoke as it emerges from the mouth of the funnel. The apparent wind blowing from the NW at the rate of 20 miles per hour, the column of smoke which rises at any given instant is, after the lapse of an hour, 20 miles distant to the SE. This recession of the column from the observer is made up of two parts, one the progress of the vessel on its course, the other the actual motion of the column as it drifts with the wind. If the first of these only was in operation, as is the case during a calm, the column would after the lapse of an hour be at B', 20 miles distant to the rear. In point of fact, however, the column after the lapse of an hour is at C'. Therefore, the wind during this hour must have been such as to carry it through the

distance B' C', that is, 15 miles SSW, which is equivalent to saying that the wind must have been blowing from NNE, at the rate of 15 miles per hour, or with force 3 on the Beaufort scale.

The true direction of the wind is always further from the bow than the apparent direction.

The true force of the wind is greater than the apparent as long as the apparent direction is abaft the beam.

The true force of the wind is less than the apparent as long as the true direction is forward of the beam.

The student will find it convenient to work problems of this kind on the chart by laying off the directions with the parallel ruler and the diagram compass, and using the scale of miles, or such other scale as given on the chart.

EXAMPLES.

Let the true course and speed be WSW $17\frac{1}{4}$ miles (statute) the apparent wind 6 points off the starboard bow (NW), force 8 miles (statute). The true direction is $13\frac{1}{2}$ points off the bow (NE $\frac{1}{2}$ N), the true force being 16 miles.

Let the true course and speed be E, 10 miles; the apparent wind 12 points off the bow (SW), force 15 miles. The true direction is $13\frac{1}{2}$ points off the bow (SW by W $\frac{1}{2}$ W), the force $23\frac{1}{4}$ miles.

A full understanding of the composition and resolution of forces and motions is of much importance. Their relation to navigation, generally, is close; but it is seen more particularly, perhaps, in current sailing and also when it becomes necessary to trace the total effect on the compasses of an iron ship to its various causes.

Force of Wind.	Velocity.	
	Statute miles per hour.	Nautical miles per hour.
0.—Calm. Full-rigged ship, all sail set, no headway.....	3	2.6
1.—Light Air. Just sufficient to give steerage way.....	8	6.9
2.—Light Breeze. Speed of 1 or 2 knots, "full and by".....	13	11.3
3.—Gentle Breeze. Speed of 3 or 4 knots, "full and by".....	18	15.6
4.—Moderate Breeze. Speed of 5 or 6 knots, "full and by".....	23	20.0
5.—Fresh Breeze. All plain sail, "full and by".....	28	24.3
6.—Strong Breeze. Topgallantsails over single-reefed topsails.....	34	29.5
7.—Moderate Gale. Double-reefed topsails.....	40	34.7
8.—Fresh Gale. Treble-reefed topsails (or reefed upper topsails and courses).....	48	41.6
9.—Strong Gale. Close-reefed topsails and courses (or lower topsails and courses).....	56	48.6
10.—Whole Gale. Close-reefed main topsail and reefed foresail (or lower main topsail and reefed foresail).....	65	56.4
11.—Storm. Storm staysails.....	75	65.1
12.—Hurricane. Under bare poles.....	90	78.1

The Beaufort Scale is commonly used by seamen for recording the force of wind. For the guidance of those unaccustomed to its use, the corresponding velocity per hour in statute miles and in nautical miles is added.

The force of wind varies from 0, a calm, to 12, a hurricane—the greatest velocity it ever reaches. Intermediate forces can be readily estimated by the personal judgment of seamen. To obtain accurate results in recording force and direction, the speed and course of a steamer must be considered.

FOG SIGNAL NOT WORKING.

The revenue cutter Tuscarora, Capt. P. H. Uberroth, sustained no damage whatever when she touched on a gravel bank while endeavoring to locate the whistle on Old Point Mackinaw during a very dense fog early on

the morning of July 11. It now develops that the keeper and his assistant did not have the fog horn going at all. It appears that the assistant failed to call the keeper and as a consequence he had overslept and did not start up the horn until 6:50 A. M., though fog had been prevailing

since 4 A. M., gradually becoming very dense by 6 A. M. Waugaschance and White Shoal were readily picked up that morning by their fog signals. Masters arriving in the vicinity of Point Mackinaw were much disturbed over their inability to get the horn and an investigation is now pending.

NAVIGATION ST. MARY'S RIVER.

Rules and regulations have been formulated governing the movements and anchorage of vessels in St. Mary's river to take effect upon the opening of the West Neebish channel. The revenue-cutter service is charged with the enforcement of these regulations and a fine of \$200 may be imposed for their violation:

RULES AND REGULATIONS.

(To take effect on the opening of the West Neebish channel.)

RULE I. *Speed.*—No vessel navigating the St. Mary's river shall proceed at a greater speed than 10 statute miles per hour over the ground between Everens point and the northern float lights in lower Hay lake, marking the end of the Middle Neebish channel, nor between the cribs in Mud lake and the cribs in Hay lake, marking the lower and upper ends, respectively, of the West Neebish channel, nor between the crib light in upper Hay lake opposite Sixmile point and the dike at Bayfield shoal, nor between the western end of St. Marys Falls canal and Big point.

Vessels of 500 tons or less are exempt from the provisions of this rule.

Vessels navigating the St. Mary's river may proceed at full speed and pass other vessels moving in the same direction between Point Detour and the Mud Lake beacon in the northern part of Mud lake, and in deep water in Hay lake. Upbound vessels may also proceed at full speed and pass other vessels going in the same direction between Mud Lake beacon and Everens point.

No vessels passing another vessel shall move at a rate of speed greater than 10 statute miles per hour over the ground. (See also Rule V.)

RULE II. *Middle and West Neebish channels.*—No upbound vessels shall pass the St. Mary's river by way of the West Neebish channel, and no downbound vessels shall pass by way of the Middle Neebish channel, except vessels of 500 tons or less and vessels making regular local stops on these channels.

RULE III. *Upbound vessels passing.*—Upbound vessels shall not pass other vessels moving in the same direction between Everens point and the red gas buoy at lower end of Little Mud lake on the Dark Hole range, nor between the second red spar buoy east of the Middle Neebish dike and the float lights marking the upper end of the Middle Neebish channel in Hay lake, nor between the crib light in upper Hay lake, opposite Sixmile point and the dike at Bayfield shoal, nor between the west end of the St. Mary's Falls Canal pier and Big point.

Upbound vessels may pass other vessels going in the same direction in Mud lake

below Everens point and in deep water in Hay lake.

RULE IV. *Downbound vessels passing.*—Downbound vessels shall not pass other vessels moving in the same direction between Big point and the St. Marys Falls canal, nor between the dike at Bayfield Shoal and the crib light in upper Hay lake opposite Sixmile point, nor between the crib lights in lower Hay lake, marking the entrance to the West Neebish channel and the crib lights marking the lower end of the West Neebish channel near the Mud lake beacon.

Downbound vessels may pass other vessels going in the same direction in deep water in Hay lake and in Mud lake below the Mud Lake beacon.

RULE V. In case one steamer desires to pass another going in the same direction on said river, at a point where such passing is permitted by these rules, the pilot of the steamer astern shall, if he intends to pass the steamer ahead on the right hand or starboard side, indicate such intention by giving one short blast of the steam whistle, and if he intends to pass such steamer ahead on the left hand or port side, he shall indicate such intention by giving two short blasts of the steam whistle. Upon the pilot of one steamer astern of another giving such signal, the pilot of the steamer ahead shall immediately answer by giving the same signal; but if he does not think it safe for the steamer astern to attempt to pass at that point, he shall immediately signify the same by giving several short and rapid blasts of the steam whistle; and under no circumstances shall the steamer astern attempt to pass the steamer ahead until such time as they have reached a point where it can be safely done, when said steamer ahead shall signify her willingness by blowing the proper signals, then the steamer ahead shall slacken to a slow rate of speed, and the steamer astern shall pass the overtaken steamer, giving the overtaken steamer as wide a berth as possible.

Steamers bound in opposite directions shall slow to half speed within one-quarter of a mile of each other until each has passed the other.

RULE VI. The patrolling vessels of the revenue-cutter service shall always have the right of way over all other vessels, as indicated by the sailing signals given by any such patrolling vessel.

RULE VII. Three distinct blasts of the steam whistle, when sounded from a patrolling vessel, will indicate that the vessel to which such signal is given is proceeding at too high a rate of speed, and such vessel must immediately moderate her speed accordingly.

RULE VIII. Four long blasts of the steam whistle, when sounded from a patrolling vessel, will indicate that the vessel to which such signal is given must

stop until further orders from the patrolling vessel.

RULE IX. Two red lanterns, one above the other, hoisted on a patrolling vessel at night, will indicate to the vessel to which such signal is given that such vessel must stop and not proceed farther toward the position where such lights are displayed.

RULE X. No vessel or raft shall anchor in any of the improved channels nor abreast of the Government piers at Sault Ste Marie, except in distress or during a fog, and any vessel so anchored must always shift her anchorage when so directed by the officer in charge of a patrolling vessel to the spot designated by such officer.

RULE XI. Vessels navigating the St. Marys river may anchor between Point Detour and Mud Lake Turning buoy, and at Sailors Encampment close to the wharves of the sawmill, in Hay lake between Neebish and Little Rapids channel, outside of the channel, as indicated by the ranges, but nothing in this rule shall be construed to prohibit any vessel from lying alongside of any wharf in said river.

RULE XII. Rafts being towed in the St. Marys river will be required to use what is termed the "Old or St. George Channel." From Harwood point to Mud Lake Turning buoy they will move at the time designated by the officer in charge of the patrolling vessel. When lying by they must be moored out of the channel.

RULE XIII. In navigating the St. Marys river, in all cases where the foregoing rules are not applicable, the attention of masters and pilots is called to the sailing rules contained in the act of Congress of February 8, 1895.

RULE XIV. All vessels navigating the St. Marys river, in passing dredges and vessels at work on improvements to the channel, will be required to slacken their speed upon such dredge or other vessels engaged in such improvement giving the signal of three distinct blasts of the steam whistle.

RULE XV. The pilot of every steamer descending the St. Marys river shall, when abreast of the Dark Hole Gas buoy and before passing around the bend of said river at Sailors Encampment, give a signal of one blast of the steam whistle of ten seconds' duration, which signal shall be answered by a blast of the steam whistle of the same duration by any vessel ascending said river within hearing. The pilot of every steamer ascending said river, not having heard such signal from a descending steamer, shall, when abreast of Everens point and before passing around the bend of said river at Sailors Encampment, give a signal of one blast of the steam whistle of ten seconds' duration, which shall be answered by a blast

of the steam whistle of the same duration by any vessel descending said river without hearing. After such signal of one blast of the steam whistle of ten seconds' duration shall have been given and answered, the usual passing signal must be given.

Vessels of 500 tons or less and local boats are alone permitted to pass down this channel.

RULE XVI. Any steamer approaching a tug towing a dredge or scow moving in the same direction may pass such tow by giving the proper signal indicating upon which side of such tow such steamer will pass, and it shall be the duty of the pilot of any such tug to sheer on the side of the channel indicated by such passing signal and give the passing steamer all possible room.

RULE XVII. No steamer stemming the current through the Dyke and Island Cut shall be allowed to tow more than one vessel without the aid of a tug, unless such steamer has the power to move the tow over the ground at the rate of at least four miles an hour.

RULE XVIII. No steamer navigating the St. Marys river, either ascending or descending, shall pass another steamer or steamers moving either in the same or opposite direction, in such a position that more than two steamers shall be abreast of each other when thus passing. In case three steamers are liable to pass in a position where more than two of them will be abreast in passing, the overtaking steamer shall check its speed within a quarter of a mile of the overtaken steamer in order to avoid passing in such position.

These regulations shall take effect on and after the opening of the West Neebish channel.

QUESTIONS FOR MASTERS AND MATES.—NO. 7.

101. What is meant by the earth's horizontal magnetic force?

102. What is meant by the earth's vertical magnetic force?

103. In which magnetic plane does the compass needle move, the horizontal or the vertical?

104. In which plane does the dipping needle work, horizontal or vertical?

105. What is meant by the earth's total magnetic force?

106. In what position must the dipping needle be placed in order to receive the earth's total magnetic force?

107. Where is the earth's horizontal magnetic force greatest and where least?

108. Where is the earth's vertical force greatest and where least?

109. Where is the variation greatest and where least?

110. How would you steer by com-

pass (no dev.) from the magnetic pole to the true north pole?

111. Where are the poles located in the steel spars of our lake boats? Which end is a north pole and which is a south pole? How do these masts become magnetic?

112. Which portion of these masts will be found to have no magnetism?

113. Which end of the dipping needle should point toward the earth on the lakes?

114. About how many degrees of dip do we have on the lakes?

115. Why is the north end of a magnetic needle called the north pole?

ANSWERS TO QUESTIONS FOR MASTERS AND MATES.—NO. 7.

101. The directive force of the earth's magnetism as it affects the compass needle.

102. The earth line of force that controls the dipping needle.

103. Horizontal.

104. Vertical.

105. The earth's total magnetic force is the sum of the horizontal and vertical forces. The effect these forces combined would have on a freely suspended magnetic needle, causing it to assume a position in the magnetic meridian and point downward toward the earth at an angle from the horizontal corresponding to the dip at that place.

106. It would have to be in line with the magnetic meridian and free to move vertically from the horizontal to the perpendicular. It would then take a position with its axis at a certain angle from the horizontal. The measure of the angle would be the dip at that place and a line through the poles of the needle would represent the earth's line of force at place.

107. At or near the equator. Least at the magnetic poles.

108. Greatest magnetic at the magnetic poles; least at the magnetic equator.

109. Between the magnetic and true poles of the earth.

110. South.

111. In the ends or extremities. The north pole is the lower end, the south pole is the upper end. They become magnetic through induction.

112. The center or middle portion.

113. The north or red end.

114. From 73° to 77°.

115. Because it points to the north pole of the earth's magnetism and is the north seeking pole.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

561. Where is the greatest depth of water in Lake Michigan?

562. What height is Lake Michigan above sea level?

563. Name all the pier head lights on the west shore of Lake Michigan that are located on the north pier.

564. Name all those that are located on the south pier.

565. What pier head lights on the east shore of Lake Michigan are located on the north piers?

566. What is the true direction of the piers at Sheboygan?

567. What is the correct magnetic bearing?

568. Lined up parallel with Sheboygan piers, how should a compass that is correct read going in?

569. How should it read coming out?

570. What course will clear Sheboygan reef coming out of Sheboygan?

ANSWERS.

551. The middle third of the tower is painted black, while the lower and upper thirds are painted white. Each stripe or band is about 30 feet wide.

552. On Big Pt. Sable, east shore of Lake Michigan 45 miles south and west of Pt. Betsie, and 7½ miles NNW from Ludington.

553. The lighthouse is situated on low land, only a few feet above the lake level. The land back of it is hilly and wooded. It has much the same appearance as Pt. Betsie, except that the hills are not near so high.

554. On Little Pt. Sable, some 28 miles south of Big Pt. Sable. The light is located on a low shore with sand hills partially covered with light timber in the background. About 10 miles south of Little Pt. Sable are the clay banks rising some 250 ft. above the level of the lake. These are very prominent and useful land marks.

555. The land at Ludington is low and sandy. North of Ludington and in the vicinity of Big Pt. Sable bluffs increase in height from the shore inland. The shore from Ludington to the Pt. trends in a NNW direction. Big Pt. Sable is a rounding sandy point both on its north and south sides. Manistee lies NE by N 16 miles from the point; the shore is clear of dangers and the land bluff and hilly. The shore from Manistee runs about NNE 8½ miles to Portage with the land bluff and hilly from 60 ft. to 180 ft. From Portage Lake

(Continued on page 29.)

DREDGING IN MANITOWOC HARBOR.

Abstract of proposals for dredging at Manitowoc harbor, Wis., received in response to advertisement dated June 26, 1908, and opened July 16, 1908, by Major W. V. Judson, corps of engineers, U. S. army, at Milwaukee, Wis.:

No. of bidders	Name and residence	Price per cu. yd.	Total, 70,000 cu. yds.
*1	Great Lakes Dredge & Dock Co., Chicago, Ill.	17½c	\$12,425.00
2	Samuel O. Dixon, Milwaukee, Wis.	18½c	12,950.00
3	Edward Bros. Dredge Co., Sault Ste. Marie, Mich.	19c	13,300.00
4	The Fitz Simons & Connell Co., Chicago, Ill.	20c	14,000.00
5	Greiling Bros., Green Bay, Wis.	18½c	12,950.00
*Lowest bid.			

BIDS FOR COAL HANDLING PLANT.

Bids received at the bureau of yards and docks, navy department, Washington, D. C., opened July 11, for the construction of a coal and ash handling plant at the navy yard at Philadelphia, Pa., were as follows:

Phil Lauth Construction Co., Chicago, Ill.	\$49,850
Hoisting Machinery Co., Arcade Bldg., Philadelphia	36,300
Snare & Triest Co., 143 Liberty St., New York	34,498
Burgin Point Iron Works, 149 Broadway, New York	29,912
Darley Engineering Co., 80 Broadway, New York	Special bid
Belmont Iron Works, Philadelphia, Pa.	37,750
Penn Bridge Co., Washington, D. C.	35,370
Conveying Machinery Co., 120 Liberty St., New York	33,364
Link Belt Co., Nicetown, Philadelphia, Pa.	39,370

BIDS FOR LOCK GATES.

Bids received by the United States engineer at Wheeling, W. Va., opened July 9, for the construction and erection of steel gates for locks at dams No. 18 and 13, Ohio river, were as follows:

Lawrence D. Weaning, Cleveland, O.	\$35,215.13
Penn Bridge Co., Beaver Falls, Pa.	39,605.22
Pennsylvania Contracting Co., Pittsburgh, Pa.	31,345.80

BIDS FOR FURNISHING PROPELLER WHEEL.

Bids received by the lighthouse inspector at Baltimore, Md., for furnishing new propeller wheel for light vessel No. 17, were as follows:

*Marine Railway, Machinery & Boiler Works, Baltimore, Md.	\$705
McIntyre & Henderson, Baltimore, Md.	725
E. J. Codd Co., Baltimore, Md.	858
Cathell Bros. & Co., Baltimore, Md.	875
*Accepted.	

REPAIRS TO LIGHT VESSEL.

Bids received by the lighthouse inspector at San Francisco, Cal., for making repairs to light vessel No. 83 were as follows:

Kerr, Lloyd Iron Works, San Francisco, Cal.	\$2,922.00
United Engineering Works, San Francisco, Cal.	3,143.00
Union Iron Works, San Francisco, Cal.	3,392.50
Moore & Scott Iron Works, San Francisco, Cal.	3,995.00
W. A. Bale & Son, Inc., San Francisco, Cal.	4,139.00
Main Street Iron Works, Inc., San Francisco, Cal.	4,485.00

DREDGING IN NORFOLK HARBOR.

Dredging shoals in Norfolk Harbor between Seaboard Air Line dock and Hospital Point, estimated quantity of material to be removed, 60,000 cu. yds., scow measurement. Coastwise Dredging Co., 11½c Norfolk Dredging Co., 10 7/10c John T. Bolton, 11c (Call of Norfolk, Va.)

BIDS FOR DREDGING HARLEM RIVER.

Bids received by Col. J. G. D. Knight, corps of engineers, U. S. army, New York, N. Y., for dredging and removing rock in Harlem river, were as follows:

	Per cu. yd.	Boulders, per cu. yd.
	scow meas'm't, solid measurement.	
Columbia Dredging Co., 64 Broad St., New York	28 85/100	\$4.00
R. G. Packard Co., 130 Pearl St., New York	64	.....
W. H. Beard Dredging Co., 21 State St., New York	29	4.00
P. Sanford Ross, Inc., 277 Washington St., Jersey City, N. J.	42 4/10	4.00
Maritime Dredging Co., 78 Broad St., New York	43	4.00
International Contracting Co., 17 Battery Pl., New York	48	4.00
Degnon Contracting Co., 60 Wall St., New York	48	4.00

BIDS FOR PUGET SOUND DRY DOCK.

Bids were opened at the navy department, Washington, July 18, for the construction of the new naval dry dock at Bremerton navy yard on Puget Sound, for which the last congress appropriated \$2,000,000. It is to be of granite and concrete construction and alternate proposals were submitted to the prospective bidders, one providing for a dock 863 ft. long, with all accessories, and the other for a dock 740 ft. long, with all accessories. The bids were as follows:

	863-ft. dock.	740-ft. dock.
Cawsey, Lohse, Winters Co., Seattle, Wash.	\$2,250,000	\$2,108,000
West Lake Constr. Co., St. Louis, Mo.	2,227,000	2,110,000
C. T. Erickson, Seattle, Wash.	1,625,000	.....
James Black Masonry & Contr. Co., St. Louis	1,999,196	1,915,000
Puget Sound Bridge & Dredging Co., Seattle, Wash.	1,975,000	1,880,000

BIDS FOR DREDGING IN HAY LAKE.

Abstract of proposals for dredging Hay Lake and Neebish Channels, St. Mary's river, Mich., received in response to advertisement dated June 18, 1908, and opened July 21, 1908, by Col. C. McD. Townsend:

No.	Name and address of bidder.	Section 3, Item 1, Little Mud Lake, 295,000 c. y. full rate; 197,000 c. y. half rate; Price per c. y.	Section 4, Item 2, Little Mud Lake, 60,700 c. y. full rate; 43,000 c. y. half rate; Price per c. y.
1.	The Lake Erie Dredging Co., Buffalo, N. Y.	\$0.24½c	.....
2.	Standard Contracting Co., Cleveland, O.	.29c	\$2.95
3.	Great Lakes Dredge & Dock Co., Chicago, Ill.	.33 9/10c	3.19
4.	Duluth Marine Contracting Co., Duluth, Minn.	.24½c	.....
5.	Samuel O. Dixon, Milwaukee, Wis.	.34 8/10c	.....
6.	Zenith Dredging Co., Duluth, Minn.	.35½c	.....
7.	Greiling Brothers, Green Bay, Wis.	.43c	.....
8.	Hickler Brothers, Sault Ste. Marie, Mich.	.....	3.39
9.	T. L. Durocher, John P. Conrick, Joseph Ganley, Sault Ste. Marie, Mich.	.....	3.47
10.	Edward Brothers, Sault Ste. Marie, Mich.	.46c	4.00

BIDS FOR TIMBER.

Abstract of proposals for furnishing and delivering at Sault Ste. Marie, Mich., about 1,328,000 ft. B. M. of hemlock timber, received in response to advertisement dated June 17, 1908, and opened July 17, 1908, by Col. C. McD. Townsend.

Name and address of bidder.	Price per M. ft. B. M.
R. J. Clark, Sault Ste. Marie, Mich.	\$17.45
*Newbegin Lumber Co., Tacoma, Wash.	10.00
Emery D. Weimer, Ludington, Mich.	17.50
G. Elias & Brother, Buffalo, N. Y.	18.65
The Robt. H. Jenks Lumber Co., Cleveland, O.	17.65
N. Mitchell De Haas, Marquette, Mich.	18.00
*f. o. b. Pacific coast.	

TORPEDO BOAT DESTROYERS FOR BRAZILIAN GOVERNMENT.

The Para, the first of 10 torpedo boat destroyers for the Brazilian government, the construction of which has been entrusted to Messrs. Yarrow & Co., Ltd., Glasgow (late of London), was successfully launched on the Clyde recently in the presence of his excellency, Admiral Duarte Huet de Bacellar, chief of the Brazilian naval commission in Europe; Capt. A. Rosauro de Almeida, chief of naval construction; Capt. Emilio Julio Hess, and other officers of the Brazilian Naval Commission, as well as Capt. Felinto Perry, who will command the vessel.

The dimensions of the Para are as follows: Length, 240 ft.; beam, 28 ft. 6 in.; fitted with two sets of triple expansion four-cylinder engines balance on the Yarrow, Schlick and Tweedy system, and two double-ended Yarrow boilers, each boiler being of about 4,000 H. P. The Para is somewhat similar to the English river type of destroyer, but larger. This launch is remarkable as being the first made from the new works of Messrs. Yarrow & Co. on the Clyde, and also the Para is the heaviest vessel ever launched by the firm.

The passenger steamer Frontenac was burned at Lorain recently. The Frontenac was purchased four years ago by H. C. Burrell, of Lorain, and put in the excursion trade between Lorain and Detroit.

The steamer Corsican ran into the schooner Isolda Bock 20 miles off Two Harbors on the night of July 26 and carried away her entire jib boom and forward upper bow. The Corsican towed the schooner into port.

Capt. George L. Spalding, who has been assistant to the government engineer at Detroit, has been transferred to Jacksonville, Fla., where he will have charge of the engineer office.

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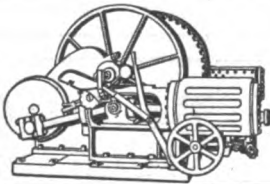
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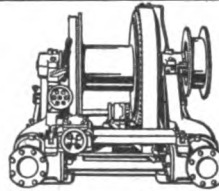
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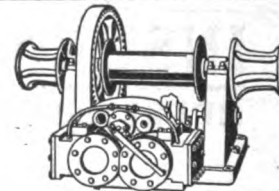
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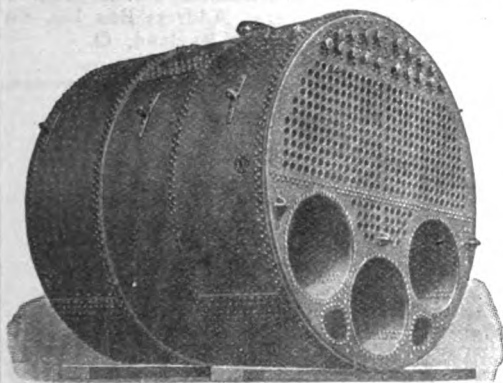
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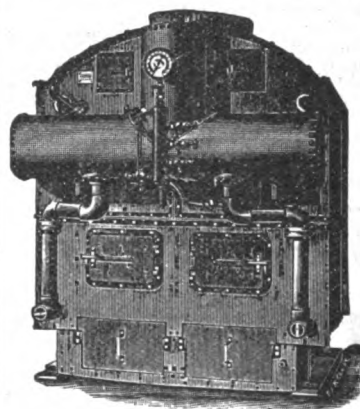
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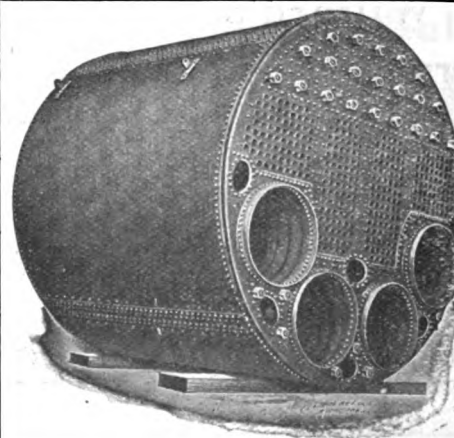
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U. S. Engineer Office, Jones building, Detroit, Mich., July 22, 1908. Sealed proposals for earth excavation for lock pit at Sault Ste. Marie, Mich., will be received at this office until 3 P. M. Aug. 24, 1908, and then publicly opened. Information on application. C. McD. Townsend, Lieut. Col., Engrs.

U. S. Engineer Office, Milwaukee, Wis., July 27, 1908. Sealed proposals for building plank crib revetment, removing old pier, and dredging at Manistique Harbor, Mich., will be received here until 2 P. M., Aug. 26, 1908, and then publicly opened. Information on application. W. V. Hudson, Major, Engrs.

PROPOSALS.—SALE OF U. S. VESSELS
St. Mary's and Shearwater. Sealed proposals will be received at the Navy Department until noon on the 5th day of August, 1908, at which time and place they will be opened, for the purchase of the U. S. S. vessels St. Mary's and Shearwater, appraised values \$4,000 and \$1,200, respectively. They will be sold for cash to the person or persons or to the corporation or corporations offering the highest price therefor. A separate proposal for each vessel bid upon must be submitted in a sealed envelope addressed to the Secretary of the Navy, Washington, D. C., endorsed "Proposals for the purchase of the U. S. S." (naming the vessel for which offer is made), and each proposal must be accompanied by a satisfactory certified check for not less than 10 per cent of the amount of the offer. On application to the Navy Department, forms of bids and bonds, together with the terms and conditions of sale, also a printed list giving general information concerning these vessels will be furnished. The vessels can be examined at any time after this date by applying to the Commandants of the navy yards, New York, N. Y., and Philadelphia, Pa., respectively, where they now lie. They must be removed from the limits of said yards within such reasonable time as may be fixed by the Department. The Department reserves the right to withdraw either or both of the above-named vessels from sale and to reject any or all bids. **TRUMAN H. NEWBERRY, Acting Secretary of the Navy.** June 30, 1908.

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